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ORIGINAL COMMUNICATIONS.

ART. XXIII.—CONVOLVULUS PANDURATUS.

By WALTER SHINN.

An Inaugural Essay.

THIS plant belongs to the Class PENTANDRIA, Order MONOGYNIA, LIN., and to the Natural Family CONVOLVULACEÆ, LIND.

Generic Characters. Calyx five-parted; corolla campanulate, plaited; stigmas two; capsule two or three-celled; cells two-seeded.—NUTTALL.

Specific Characters.—Stem twining; leaves cordate, or panduriform, acuminate, lobes rounded; peduncles one to five-flowered; bracts small, at the base of the peduncles; flowers fasciculate, corolla tubular, campanulate.—BECK.

Description.—The root is perennial, very large, cylindrical, spindle-shaped, and marked by longitudinal fissures. It is usually from two to four inches in thickness, and from two to three feet in length, branched towards its extremity, and of an ochre color. PURSH states that, in some instances, it attains to an enormous size; that he has seen one the thickness of a man's thigh. It abounds in a white succulent fluid. "The stem is twining, generally procumbent upon the earth, and not unfrequently climbing upon fences. It is round, and of a greenish-purple color. The leaves are broad, heart-shaped, entire, lobed panduriform, somewhat acuminate, deep green above, and lighter underneath, situated on long petioles

Flowers in fascicles, calyx smooth, awnless; corolla subulate-campanulate, white, with the tube purplish-red at the base, both externally and within. The peduncles and petioles have a common origin, and are arranged in pairs. The flower buds are of a purplish-red hue at first, and, when further advanced, are straw colored. The plant flowers from June to August."—W. P. C. BARTON.

The common name, of *Wild Potato*, which the plant bears, has originated from the appearance of the root. The specific appellation has been given from the panduriform shape of the leaves, which is sometimes met with, bearing some analogy to the fiddle. According to Dr. DARLINGTON, "the specimens with fiddle-shaped leaves have generally a broad, shallow sinus at base, with the calyx often roughish pubescent, and seem, indeed, to constitute a pretty distinct *variety*." They are less common than the others.

Habitat.—It is indigenous to the United States, and extends from Canada to Florida, thriving in sandy soil, in old, uncultivated fields, where it forms a sort of carpeting for the earth, from the luxuriance of its growth and the interlacing of the stems.

Sensible properties.—The root, which constitutes the active portion, is possessed of a disagreeable odor when fresh, and a bitter, acrid taste; these are somewhat diminished by desiccation; by this process about three-fourths of the weight are lost. In the dried state, it is brought to us in circular pieces of different sizes, varying in diameter from an inch to two or more. They are formed by transverse sections of the root, and are composed of two parts; an external corrugated cortical portion, or investing circle, a line or more in thickness; and an internal parenchematous substance, which is a little depressed upon the flat surfaces, and striated; the striæ diverging from the centre to the circumference. The color is ashen-gray, inclining to brown externally, whitish internally. The structure is compact and somewhat fibrous. Some force is required to pulverize the pieces. The powder is whitish, with an ashen tint. The pieces bear some resemblance to the segments of briony root. By Dr.

B. S. BARTON, we are informed that in Delaware the root is called *kaussauder*, or kassadar, which are corruptions of the word *cassada*, most probably negro names. It would appear that the best time for collection is the autumn.

Chemical constitution.—Long as this article of the indigenous materia medica has been known, it does not appear that any experiments have been instituted to determine its chemical constituents, at least, we have been unable to discover that any such attempt has been made, from the means of information at command. It is therefore, with the desire to throw some light upon this portion of its history, that the following essay at analysis has been entered upon. The root employed was collected late in the autumn, cut into transverse slices, and carefully dried in the open air.

Experiment 1st.—A decoction was made by boiling an ounce of the root, well bruized, in a pint of water for fifteen minutes, and straining. It was of a thick, sirupy consistence, of a dull brown color, and possessed the bitter taste of the root, with a slight degree of acrimony. To a portion of this decoction, a small quantity of a solution of iodine was added, which occasioned a deep blue color. With portions of the remaining decoction, a solution of the sulphate of iron produced a blue precipitate. Alcohol, and a solution of subacetate of lead, occasioned white precipitates, and gelatine produced no appreciable alteration.

Experiment 2d.—A tincture was made by macerating two ounces of the bruised root in a pint of diluted alcohol, for two weeks, and then filtering. It was of a clear, bright red color, possessing a bitter, nauseous taste, with a slight degree of acrimony. This tincture, divided into portions, afforded a white precipitate with corrosive sublimate, indicating the presence of albumen, and was rendered turbid by water, from the separation of resin. When evaporated, an extract was formed of a reddish-brown color, which was bitter to the taste, the acrimony of the tincture having been removed by heat.

Experiment 3d.—An ounce of the powder was macerated in four ounces of absolute alcohol for seven days, and filtered. The tincture was of a light yellowish-brown color. A por-

tion of it was evaporated to the consistence of an extract, which was of a reddish-brown color, and, to the taste, very bitter, and somewhat nauseous. Another portion was evaporated to one-half, and water added, which, at first, rendered it milky, but, in the course of a few hours, occasioned a delicate yellow precipitate. The clear liquor was then decanted, and the precipitate set aside for some time, when it became brittle and translucent. To the taste, this was much more nauseous than the extract, but not so bitter. It was soluble both in ether and alcohol, and burned with a yellow flame, emitting much smoke.

Experiment 4th.—An ounce of the powder was macerated in four ounces of sulphuric ether for seven days, and filtered. The solution was clear, and of a yellowish color. Water, when added, rendered it milky, and, when the admixture was evaporated, a yellowish oily matter was obtained floating upon the surface; it possessed a pungent, burning taste. This oily substance was found to leave a permanent greasy stain upon paper, and with a solution of potassa to form a soapy compound.

Experiment 5th.—Five hundred grains of the root were incinnerated, and forty grains of ashes were obtained, which were lixiviated with boiling water and filtered. The clear liquor was evaporated to dryness and a whitish powder obtained, which possessed the property of neutralizing acids. With nitric acid it formed a crystalline salt, having all the properties of nitrate of potassa.

Experiment 6th.—The residue of the last experiment was subjected to the action of dilute nitric acid and filtered. The solution produced a white precipitate with oxalate of ammonia, affording evidence of the presence of lime.

From the foregoing experiments, we are lead to conclude that this root contains the following principles, viz., *starch, gum, gallic acid, albumen, resin, fixed oil, potassa, and lime;* to which may be added, *bitter extractive, lignin, and coloring matter.*

Medical Properties.—Very little specific information is

possessed as regards the therapeutic value of this article. It is known, however, to produce a decided impression upon the alimentary canal, followed by purgative effects. On this account, it has been employed by country practitioners as a substitute for jalap, but compared with this medicine its operation is feeble; it is stated to resemble that of rhubarb. Dr. B. S. BARTON, informs us that, without doubt, it is the *Mechameck*, or wild rhubarb of the Indians. It would seem also to possess diuretic powers, and has acquired some reputation as an antilithic. In cases of calculous concretions, its efficacy has been noticed by Dr. HARRIS, of New Jersey, "who found an infusion or decoction of the root very useful in his own person; he was persuaded that it enabled him to pass the calculous granules with greater facility."

Affinities.—The family of *Convolvulaceæ*, or Bind Weed tribe, to which the plant under consideration belongs, is one of the most natural to be found in the whole list of those which have been brought under classification. The individuals composing it, are so closely allied by botanical resemblances, that no difficulty presents in determing their position, while, at the same time, a uniformity of chemical constitution is so evident in those which have been examined, that a similarity of medicinal property must follow as an ordinary result. To this but few opposing anomalies have presented. The active purgative principle of the family is the *resinoid matter*, which has been found abundantly in the root of the *Ipomœa jalapa, Convolvulus scammonia, C. mechoacan, C. turpethum, C. scoparius*, and from the foregoing analysis in that of the *C. panduratus*. A similar resin is also reported by DESLONGCHAMPS to exist in the *C. soldanella*, and *C. althœoides*. With the amount of the resin the activity diminishes or increases. The *C. battatas*, and *C. edulis*, in a cultivated state, are entirely free from it; the former is the common sweet potato. These constitute the sole exceptions. Much of the alteration, however, which these species undergo is no doubt due to soil and climate. In fact, so general is the resemblance, that, when speaking of this family, MURRAY observes, "no other

is more favorable for those who believe in the possibility of judging of the virtues of plants from their exterior conformation."*

Forms of exhibition.—The root has been administered in powder and decoction, from its little activity; the former may be given in doses of forty grains, or a drachm. The decoction has already been mentioned as a remedy in gravel. It may be made by adding a pint of water to the ounce of powered root. An extract has been proposed, which, in combination, might be made useful. Such an extract is spoken of by the late Prof. BARTON as little inferior to the scammony of the shops. It is consonant with experiment, however, to suppose that diluted alcohol constitutes the appropriate menstruum.

*We have been informed by Dr. SKINNER, who resided for a number of years, as the Governor of Liberia, on the West Coast of Africa, that he there met with a species of Convolvulus having a large root, which possessed properties so active as to produce purging and inflammation of the intestines of hogs, who happened to eat it. J. C.

ART. XXIV.—OBSERVATIONS ON XEROPHYLLUM SETIFOLIUM. By WILLIAM PROCTER, jr.

THE evidence in favor of the natural method of classifying plants, is becoming every day strengthened by the results of chemical analysis; and while this will be an important agent in rendering that classification permanent, on the other hand analogical reasoning, founded on facts, already the base of that method, will greatly facilitate the chemist in his advance into the comparatively little known region of *Chemical Botany.*

The plant under consideration came to notice, in a chemical point of view, from its association with Veratrum, Colchicum, &c., in the Natural Family MELANTHACEÆ, suggesting the idea that it might contain a similar principle. The sequel will show that it does contain an *alkaloid*, though it differs in its chemical and sensible properties from Veratria.

What the medical properties and power of this plant are, has not yet been determined, though we may infer them analogous to those of the above named genera.

BOTANICAL HISTORY.

XEROPHYLLUM *setifolium.*

Natural Family MELANTHACEÆ. Class HEXANDRIA. Order TRIGYNIA.—LIN.

Generic characters.—Perianth sub-rotate, deeply six-parted, stamens six, contiguous at base, stigmas three, revolute, partly united below, capsule sub-globose, three-celled, cells two-seeded, opening at the summit.

Syn.—Helonias asphodeloides.—LIN.

Vulgar names.—Turkey's Beard, Pond Posey.

X. setifolium, MICH. Leaves subulate-setaceous, flowers in a crowded raceme with setaceous bracts; filaments broad at base and as long as the corolla; scape leafy. This plant has a perennial root, consisting of a caudex or head, from which emanate many fibres of several inches in length.

Habitat.—It is found in the pine woods of New Jer-

sey and North Carolina; it is peculiar to a sandy soil, and flowers in June. It usually attains the height of three or four feet, and is conspicuous for its head of showy white flowers, which terminate the scape, and, at a distance, give to it the appearance of a long feather. The radical leaves are in thick and bunchy tufts, arranged at their juncture with the root, somewhat in a tunicated manner. From their resemblance to those of the *Gramineæ*, it has received the appellation of *pine grass.*

CHEMICAL HISTORY.

The decoction of the root of the *Xerophyllum setifolium* is of a light brown color, and possesses the taste and odor of the plant. To a portion of the decoction, sub-acetate of lead was added, which produced a very copious precipitate, and the compound of oxide of lead, gum, and starch, thus formed, equalled in weight one-sixth of the root employed.

Tincture of iodine caused the blue precipitate, so characteristic of starch.

Sulphate of iron and gelatine had no action on it.

A portion of the decoction was treated with pure alumine, and filtered, but gave no evidence of gallic acid when sulphate of iron or lime water were added.

A portion of the bruised root was submitted to distillation with water. The distilled liquid had the odor of the root in a concentrated degree, but owing to the limited quantity of root in my possession, the process could not be continued by repeating the distillation, so as to gain ocular proof of the presence of volatile oil, though its existence is highly probable.

A portion of the root was macerated in cold water for twelve hours, and filtered. Bi-chloride of mercury added to this filtered liquid, caused a precipitate indicative of vegetable albumen, which result was confirmed on adding to another portion of the infusion, a solution of ferrocyanuret of potassium, acidulated with acetic acid.

The alcoholic tincture is rendered turbid by the addition of water, and deposits a precipitate on standing.

By evaporation, it yields a resinous extract.

An ethereal tincture was made by digesting a portion of the bruised root in sulphuric ether for thirty-six hours. On evaporating this an oily matter was obtained, which communicated a greasy stain to paper, and was saponifiable.

A quantity of the root, amounting to about five ounces, was macerated in water for forty-eight hours, and then the temperature increased to ebullition. The decoction, thus prepared, possessed the sensible properties of the root. To this, subacetate of lead was added until it ceased to cause a precipitate, then filtered, and the excess of lead separated by a current of hydrosulphuric acid in the usual manner. By these means the decoction is deprived of a large quantity of vegetable matter, and is nearly colorless. An excess of magnesia was then added, and the whole thrown on a filter, to separate the precipitate. This, when dried, was treated with boiling alcohol, and the filtered solution evaporated to dryness. The residue consists of a mass of acicular crystals, agglutinated together by some foreign matter; by redissolving in alcohol, and boiling with animal charcoal, they are deprived of most of their color.

This substance has a marked bitterness, which is sensible for some time in the mouth; has a decided alkaline action on reddened litmus paper, and is capable of saturating acids, and forming with them crystallizable salts. It is very soluble in alcohol and ether, and but slightly soluble in water; nitric acid decomposes it without turning it red.

Combined with sulphuric acid, this alkaloid forms a salt, crystallizing in beautiful tufts of acicular crystals, radiating from a common centre. It is very soluble in water, but less so in alcohol.

The nitrate, hydrochlorate, and acetate, all crystallize, though the latter with difficulty, owing to its disposition to absorb moisture.

From the alkaline nature of this principle, it should be

classed among the vegetable alkalies, and hence deserves the name of *Xerophia*, from the plant.

From the foregoing observations, we may infer that the principal ingredients of *Xerophyllum setifolium* are--1, *gum;* 2, *starch;* 3, *volatile oil;* 4, *resin;* 5, *fixed oil;* 6, *vegetable albumen;* 7, *a peculiar alkaline principle*, styled *Xerophia*.

ART. XXV.—ON THE ADULTERATION OF LAC SULPHURIS.

THE following remarks, on lac sulphuris, are intended to call the attention of pharmaceutists to the fact of its frequent adulteration, which, though well known, and easily ascertained, appears not to be sufficiently attended to, as the adulterated article is as frequently to be found in our shops as the pure.

Under the name of lac sulphuris, two articles are imported and vended in this city, with a difference of price which could not obtain, unless the low priced medicine was depreciated in value by some improper means. This, on examination, turns out to be the fact. A number of specimens, obtained from different quarters, on being subjected to a low red heat, were volatilized; some totally, while others so partially as not to appear even to be reduced in bulk, but leaving behind a residue of sulphate of lime, averaging, in several experiments, fifty per cent.

The lac sulphuris being that modification which is recommended as the most to be preferred, it must happen, when this inferior article is used, that the physician is dissappointed in the result of its administration; for if we make due allowance for the 21 or 22 per cent. of water contained in the sulphate of lime, which was driven off withthe sulphur at the low red heat used, there will remain even less than 40 per cent. as the amount of sulphur in the preparation.

The pure article ought to be a powder of greenish-yellow hue, possessing but litte taste or smell; insoluble in water, and totally vaporizable by heat; when pressed between the fingers it ought, even in small quantities, to communicate a sensation of harshness, arising from friction between the crystalline particles, little to be expected from a powder apparently so minute. This latter circumstance will probably afford an easy means of detecting impurity,—as it cannot be much adulterated when it communicates this sensation on pressure; for when equal parts of the pure and impure commercial variety are thoroughly mixed, by being shaken together, this is rendered almost imperceptible.

The adulterated article is whiter than the pure, and yields no peculiar sensation on being pressed between the fingers, except when in a large lump, and even then the sensation is very slight. R. B.

ART. XXVI.—ON TINCTURE OF KINO.

By Augustine Duhamel.

The article kino, as is well known, is disposed, when in alcoholic solution to become gelatinous. This, if not invariably, at least very generally happens by the ordinary method of making the tincture, which is by merely putting the allotted portion of kino in a bottle containing alcohol, which is then shaken a little and set aside for use.

In about a month, or in less time, after this, the tincture will be perceived to have assumed a gelatinous form, unpleasant to the eye, unfit for use, and not susceptible of filtration through paper. To prevent this, various means have been tried. Alcohol, in a diluted state, which was thought to obviate the change, proved of no avail to me. In the case of the exceptions from this change, the substances represented as kino may have been obtained from sources different from

that from which our mart is usually furnished, and varied in character from that generally employed.

There are several varieties of astringent vegetable extracts considered as kino, seven of which are described by GUIBOURT, all more or less soluble in boiling water and alcohol, to which last they impart a beautiful red color. To discriminate between these various qualities, requires an eye familar with their general appearance. Catechu, broken in very *small* lumps, is sometimes sold and used for kino. This is not liable to gelatinize. It may always be distinguished from kino by being less soluble in alcohol, and wanting the red coloring principle which is developed by this last.

The object of this note is more particularly to observe that the Tincture of Kino, made by the method of displacement, is not liable to gelatinize. All that is required is to bruise the kino, then mix with it some clear sand, and subject it to the action of alcohol in a proper instrument. The result of the elimination will be a deeply colored, but very limpid astringent tincture, containing all the soluble parts of the kino, while a little insoluble residuum alone remains in the filter along with the sand. Some that has been prepared in this manner, more than six months ago, has since undergone no change whatever.

Kino, according to analysis, contains tannin, resin, extractive, and coloring matter.

The first of these is the active agent. By displacement, it appears that all these principles are carried off by the alcohol with the exception of the insoluble extractive, (*apothême* of BERZELIUS,) which is left behind, and to the action of this last substance may we attribute the decomposition of the tincture by long contact with alcohol. The nature of this substance remains to be determined.

ART. XXVII.—OBSERVATIONS ON THE METHOD OF DISPLACEMENT.

By Augustine Duhamel, and William Procter, Jr. (*Sequel to the Essay on same subject*, Art. I., No. 1, Vol. IV., New Series, *of this Journal.*)

In a somewhat detailed notice of this new process, and its adaptation to the ordinary operations of pharmacy, published in one of the foregoing numbers of this Journal, the attempt was made by one of the authors of this communication to attract the attention of the profession towards some of its advantages, in the expectation that the subject would be followed up by our colleagues generally, and be made the theme of experiment, by which its merits might be properly tested, and accordingly appreciated. But from the little that has been said about it, and the apparent want of knowledge concerning its adaptation, we are sensible that something further is needed. Conscious of this, we have entered upon the present essay, with the view to contribute the sum of our joint experience in the application of the displacement system to some of the most essential preparations of medicines, that are brought into daily requisition; hoping by a candid statement of facts connected with the results, together with the more tangible proofs in the exhibition of the products themselves, to do away with all prejudices, and convince the most sceptical that the great advantages, said to be derived from its employment, are not chimerical.

The superiority of the method of displacement over the usual mode of preparing medicines, as directed by our Pharmacopœia, has not escaped the sagacity of the French pharmaceutists. In France, this method has been extensively applied, with almost invariable success, whilst in this country it is hardly known, much less applied.

Impressed with the great advantages which would result from its introduction into American Pharmacy, we feel constrained to make these observations at this time, while it is yet within the power of the revisors of our Pharmacopœia, to

give this method their sanction, by adopting it in general, or recommending it in particular cases, in the work which will result from their labors. We do not wish to be understood as advocating a process because of its novelty, but only on the solid and substantial basis of its own intrinsic merits. We have extensively employed it in pharmaceutical operations, and, consequently, speak from experience. All we ask from those who may undertake a verification of our statements, is the same devotion, care, and precision, in the labor of investigation, which attended our experiments, if they wish to obtain equally definite results. These observations are the more necessary, as the greatest success depends upon the dexterity and attention which may be given to the experiments, for it can hardly be expected that a clumsy operator will, in any instance, draw favorable results.

EXTRACTS.

The best prepared extracts should not be black, but more or less brown in color, except when viewed in mass, and when held up to the light, should be transparent. They should have the characteristic taste, as well as odor, when it possesses any, of the plant used to make the extract, and should not have a burnt taste. A great variety of the extracts in present use, particularly the narcotic, as imported from England, contain a large quantity of chlorophylle, and have a greenish, unctuous appearance; their light green color has given rise to the supposition that a portion of the powdered leaves was incorporated with them. With water, they make a very turbid solution, depositing a sediment upon standing, and leaving a great deal of insoluble matter upon the filter.

In preparing an extract, very large quantities of water are employed in successive boilings, to exhaust the plant of its virtues, all of which must be evaporated, to the detriment of the quality of the products. By displacement, this is avoided, as the substances, by ceding their soluble principles to very small quantities of water, enable you to obtain highly concentrated solutions.

The extracts of narcotic plants, and those which contain volatile oils, both of which require great care in their preparation, particularly the former, are rendered very superior by this process of lixiviation. They are perfectly soluble in cold water, and richer in active principles than those obtained by boiling water or alcohol. They yield transparent solutions, which is not the case with most of those made by heat, owing to the presence of fecula, which is necessarily left behind, when displacement is used, and should any vegetable albumen be present, it is coagulated by the subsequent heat in evaporating, and can easily be separated.

From the results of a number of experiments, the quantity is very little, if at all, inferior to the old method, and the quality, in most instances, is decidedly better. Even *Gentian*, treated in this way, yields an equal amount of extract.

Extract of Chamomile, as thus prepared, is a faithful representative of the plant. We have seen a variety of extracts, of the narcotic class, made by M. Boullay, of Paris, by displacement, and while we have tested their ready solubility, we have the most complete evidence of their therapeutic qualities, as tried by our physicians.

Digitalis.—From experiments made with digitalis, we find that 100 parts of the leaves, subjected to the action of water, furnished, by

Decoction and expression,	25 parts.
Displacement with cold water,	24 "
Maceration in alcohol,	31 "
Displacement with alcohol,	30 "
Maceration and displacement with alcohol,	32 "

The product of the displacement treatment, with cold water, yielded a beautiful, translucid extract, brittle, deliquescent, very soluble, and of great activity. The others contained more or less of resin and insoluble matters. By displacement, the first portions of liquid which escaped from the bottom of the funnel, were black, of a sirupy consistence, and of an acrid, bitter taste. Those which followed were

paler in succession, and the last had hardly any color, and no other taste than that of the menstruum.

From the dried leaves of *Cicuta, Stramonium*, and *Belladonna*, treated with cold water, we obtained a quantity of soluble extract of pilular consistence, equal, in two instances, to one-fourth of the weight of the substance employed.

The *Compound Extract of Colocynth* can, by this method, be made in thirty-six hours, with very little trouble, whilst, by the old process, seven days are required.

The outline of this process is as follows: the quantity of pulp of colocynth directed by the formula, is bruised finely, placed in a displacement apparatus, and treated with the proper quantity of diluted alcohol in successive portions. So completely does this remove the bitter principle, that the pulp may be chewed without communicating, very sensibly, its distinguishing property to the taste.

The *Aloes, Scammony, Soap*, and *Cardamum*, are coarsely bruised, mixed with an equal bulk of white sand, and the whole thrown in the displacement filter, and treated with the tincture of colocynth. Before all of the latter has passed, nothing remains in the filter but the sand, impurities, and cardamum pods; finally, evaporate by a gentle heat until the proper consistence is attained.

TINCTURES.

The displacement method applies particularly well to tinctures, which are obtained in an astonishingly rapid and regular manner. Though we do not yet go so far as to recommend it in the indiscriminate preparation of all the tinctures, still, from our experiments with a great number of those made with vegetable powders, we are satisfied that their superiority in strength, handsome appearance, and the readiness with which they can be prepared, claim, for the new method, our decided preference.

The direction attached to the formulæ of the Pharmacopœia under the head of tinctures, is to macerate for a certain number of days, say ten, or more, and then filter through paper. In

the interval this preparation cannot be considered fit for medical dispensation, not having imbibed the whole active portion of the substance. In the mean time, should any be needed, an imperfectly saturated, and therefore unequal preparation must be given, or else the demand be refused; for we question much if there be a single store in the city, where there are two bottles for every tincture, one of which is finished, and the other undergoing preparation.

By using displacement, instead of ten days, or a fortnight, we may have, in as many hours, or less, a clear tincture, replete with all the active principles, so that there can be no delay either in supplying a large order, or forming some new tincture to answer the more immediate call of the physician.

In compliance with the direction of the Pharmacopœia, when the maceration is complete, the whole is thrown upon a paper filter, and left to itself until no more passes through: the residuum upon the filter, without more ado, is thrown away. Mechanical pressure is seldom resorted to, and no attention is paid to the loss, which, in the case of bulky, light, or spongy substances, is very considerable, from the quantity of menstruum absorbed. Let us take, for instance, the *Vinous Tincture of Colchicum Root*, and we will endeavor to show with how much waste the preparation of tinctures is attended. Considerations of economy may possibly urge those to a partial recourse to the displacement method, who, from mere habit, profess an attachment to the ordinary routine.

The Pharmacopœia directs half a pound of the bruised meadow saffron root to a pint of wine, and fourteen days maceration before filtering. The bruised root introduced into the bottle will be found to occupy nearly half its space. The wine next added, and the whole shaken up, will make a thick mixture, which, after being placed at rest for some time, will present to the eye a supernatant liquid, measuring about one-third of the quantity of wine employed, while the remainder is sediment. At the end of the fourteen days, it will be found, after filtration, that what was the pint originally, is now represented by only one-half, without any advantage in strength; the other half,

(no insignificant quantity) is retained by the powder, and though saturated equally with the liquid collected, is abandoned and lost. Sometimes the deficiency is made up with a new portion of wine, which will reduce the tincture one-half in strength. By displacement, the whole of this might be obtained. All that is necessary would be to pour over the dregs, on the filter, about two ounces of wine, and the place of this, when absorbed, to be supplied by additions of water, until the pint of menstruum is made up from the percolation.

The same remarks apply to tinctures from the leaves which largely absorb the liquids.

In displacing one liquid by another of a different nature, especially alcohol by water, to prevent admixture, it is necessary to interpose one or two ounces of the same liquid before adding another. In most cases, it is preferable to use the same menstruum to the end of the process.

Without any previous maceration, we formed tinctures from the leaves of all the *narcotic* class of plants, some of the *diuretic* class, and likewise from the following substances, viz:—

Senna, Lobelia, Rhatany, Opium, Capsicum, Cubebs, Valerian, Rhubarb, Bark, Colocynth, Serpentaria, Hellebore, Ginger, and Galls.

This method answers equally well for the tinctures of animal substances, as *Castor, Musk, and Cantharides.*

TINCTURES OF GUM RESINS.

One of the best results of the displacement application is the the beautiful limpid tinctures, obtained from resinous substances, in a very expeditious manner. The resinous tinctures, made by us in this manner, were those of *Myrrh, Guaiacum, Benzoin,* and *Assafœtida.*

The coarsely bruised ingredients should be mixed with about half their weight of sand before being placed in the instrument, in the neck of which some clean straw should be closely pressed; then disseminate rectified alcohol by small quantities at the time over its surface. The first portions which pass will be turbid, and should be returned back until the

liquid issues perfectly limpid. Assafœtida when thus treated gives a very fine tincture, and, at the same time, relieves us from the inconvenience of a protracted filtration, to which its viscous nature gives occasion.

This class of tinctures, from the uniform character of the substances from which they are made, are more readily formed than the tinctures of roots or leaves. By these means our shop bottles would present a finer appearance, from having no sediment, which, in the case of gum resins, is often very difficult to remove from the bottom of the bottle. We have found displacement an excellent auxiliary in the preparation of some of the tinctures from the vegetable extracts, such as *Catechu* and *Kino*.

The *Acetous Tincture of Squills*, after a long maceration, becomes very difficult to filter. By resorting to immediate displacement, all the desired objects can be obtained at once.

INFUSIONS.

In making infusions it is a desideratum to obtain them transparent, and free from sediment, possessing the properties of the infused substance, and in as short a period as possible. These are not wholly accomplished in the ordinary method, especially in the case of bark, which resumes its opacity after filtration. But, by displacement, these three ends are completely answered; and further, when thus made, the preparations keep longer, being less liable to fermentation from the absence of starch in solution.

The subjects of our essay were principally *Bark*, *Rhubarb*, *Digitalis*, *Belladonna*, *Chamomile*, and *Gentian*.

SYRUPS.

The presence of starch in many syrups is a serious inconvenience, rendering them liable to the fermentative process; notwithstanding they may be saturated solutions of sugar. When made by displacement, however, this is entirely obviated, at the same time that a preparation is obtained possessed of all the virtues of the plant.

We have taken advantage of the concentrative power, offered by displacement, to make some new syrups of great activity, which have been extensively used, and of which we subjoin a notice.

First in order comes *Rhatany*, a substance upon which the Messrs. Boullay have made some interesting experiments, proving, in a most satisfactory manner, that the extracts obtained by displacement are vastly superior to those made by the ordinary boiling process.

Syrup of Rhatany.

Take of

Rhatany root in a bruised state, (mashed in a mill) or in coarse powder, . . .	1 pound.
Water, ...	q. s.
Refined Sugar, ...	2 pounds.

Mix with the root sufficient water to render the whole thoroughly moist; afterwards place it in a Boullay's filtering instrument, and operate by displacement with the remainder of the water, until you have obtaind thirty-two ounces. Then evaporate, in a water bath, to sixteen ounces, and add the sugar. Form a syrup, marking 31° B., boiling.

This will make one quart of a beautiful and powerfully astringent syrup, containing fourteen drachms of soluble extract,—of which each ounce will contain twenty-six grains.

Syrup of Uva Ursi.

Take of

Uva Ursi	4 ounces.
Water, ...	q. s.
Refined Sugar, ...	1 pound.

First bruise the uva ursi, and add a sufficiency of the menstruum to render it thoroughly moist; then place it in a Boullay's filtering instrument, and operate, by displacement, until you have exhausted it of all its soluble active principles; this may be known by the last portions of water being nearly devoid of taste and color; then evaporate in a water bath to ten ounces, add the sugar, and form a syrup, marking 31° B.

This gives a pint of syrup, containing about twenty grains to the ounce of soluble extract.

After the above type we have formed a *Syrup of Bark*, containing twenty grains of soluble extract to the ounce; and in the same manner and proportion, *Syrup of Digitalis*, containing 30 grains to the ounce.

Also, *Syrup of Senna*, containing twenty-four grains per ounce.

In like manner and proportions, we have made the *Syrups of Boneset*, *Buchu*, and *Pareira Brava;* and though we have not ascertained their relative products in soluble extract, we have found them very efficient preparations. We have made the syrup of *Ipecacuanha* by displacement agreeably to the standard of the French Codex. We have made the syrups of *Sarsaparilla*, *Rhubarb*, both *simple* and *aromatic*, and *Seneka*, agreeable to the proportions of the United States Pharmacopœia, and have every reason to be satisfied with their quality.

Sarsaparilla furnishes a very fine syrup, and though we have prepared from one to a hundred gallons, none of it has evinced a disposition to ferment. Could we know to what extent the virtues of sarsaparilla are impaired by long boiling, we might form some idea of the advantage to be gained by the displacement method in the preparation of the syrup. As it is, the inconveniences of the old method are so entirely obviated by it, and, moreover, it is so economical, that it can hardly fail to attract attention.

Simple water may be employed in lieu of diluted alcohol, as the menstruum, which is recommended to avoid the fecula; but this being wasted during the evaporation, makes a considerable item of expenditure when the syrup is prepared in large quantities. Cold water, in taking up the soluble active principles, leaves the fecula behind. The liquid, as it ran from the bottom, was very black, and communicated to the taste the peculiar acrimony of the root when good, and the mass of it had the smell of the infusion of this root.

Mel Scillæ Comp., or Hive Syrup.

This diaphoretic and expectorant syrup, so useful in the croup of children, has been the subject of much experiment

among apothecaries, with the view to produce a very active preparation not liable to ferment. As this object is not effected by adopting the process of the United States Pharmacopœia, which is very liable to fermentation, we have long since rejected the method there directed. We have found that water was not the best menstruum for seneka and squill, and that weak alcohol was better suited for the extraction of their virtues. Acting under this conviction, we substituted alcoholic maceration in place of watery decoction, and, after due time, filtered and evaporated it, finishing with the addition of the honey. In this manner we succeeded in obtaining an active preparation, but yet we had not overcome its disposition to ferment. It then occurred to us that the honey was the great obstacle to the attainment of our end, for though we tried various kinds of honey, it was so certain to ferment, after being made two or three weeks, that we could prepare only a small quantity at the time. We then supplied the place of honey by sugar, and our aim was accomplished. Further experiments have led us, as we believe, to the *ultimatum* of success. It furnishes a beautiful syrup, not so highly colored as in the old way, and is very energetic. It acts as a ready emetic when required, while the double dose of such as is commonly made, often disappoints the nurse or physician. When carefully prepared, it will keep a long time without any symptom of fermentation. This is the formula:

Take of

Squill and Seneka, each,	2 ounces.
Diluted Alcohol, 18° B.,	q. s.
Tartar Emetic,	grs. 32
Refined Sugar,	2 pounds.

Put the squill and seneka, reduced to very coarse powder, in a capsule, and saturate with the weak alcohol; a quantity that will just cover its surface will suffice. At the expiration of twelve hours, place it in a BOULLAY's instrument, and operate by displacement until you obtain thirty-two ounces; then evaporate in a water bath to sixteen ounces; add the tartar

emetic, and afterwards the sugar. Then boil a little to form a syrup, marking 32° B. The antimony should not be added to it while in a metallic vessel.

Although the proportions of seneka and squill are but one-half, yet this syrup is stronger than that of the recipe of the United States Pharmacopœia.

Upon the whole, we are satisfied as to the utility of the method of displacement, applied to the greatest number of medicinal agents which are more or less changed by decoction or prolonged evaporation.

We feel satisfied that a long maceration, as directed by formulæ in the case of tinctures, is utterly useless, if not productive of waste with the greatest number, and that by immediate and continued displacement we can extract the virtues of a plant more readily and fully than by infusion, long maceration, or decoction.

By reference to the latest edition of the Codex Pharmacopeé Française, redacted by order of Government, in 1835, we find this principle adopted in a great number of preparations. Among these are the Extracts of Liquorice, Burdock, Bistort, Elecampane, Gentian, Dock, Rhatany, Quassia, Bittersweet, Willow, Wormwood, Digitalis, Blessed-thistle, Borage, Senna, Chamomile, Belladonna, Centaury, Cicuta, Aconite, Hyoscyamus, Stramonium, Rue, Savine, Arnica, Pomegranate, Hop, Cainca, Colchicum, Columbo, Ipecac., Valerian, Sarsaparilla, Seneca, Jalap, Cantharides, Black Hellebore, and a number of others, the use of which is confined to Europe, and therefore of little consequence to mention. Of the above mentioned, some are alcoholic, and some aqueous. They recommend it also in making the essential salt of bark. Also in the entire class of *Ethereal Tinctures.*

In conclusion, we commend the subject to the notice of the revisors of the new Pharmacopœia, trusting, in the hope it may be found worthy their attention, to see it recommended in their coming work.

While upon the subject of the Pharmacopœia, we are led to inquire, from having lately observed a notification in the

public papers of the election of delegates to represent the State of Pennsylvania in the general Convention for revising the National Pharmacopœia, whether any thing has been done by our apothecaries in relation to the contemplated objects of this assembly. Curiosity is awakened in us to know if a committee from the College has been, or is likely to be appointed, to assist in a work which we regard as of the highest utility to themselves, and immediately connected with the interests of their profession. In the same curious spirit we would ask, if they have no suggestions of their own to make in reference to the improvement of some of the processes of the present standard? Whether, as practical pharmaceutists, their every day experience in the prosecution of their duties has not convinced them, supposing they have given a fair trial by rigidly adhering to the methods prescribed in the Pharmacopœia, of the possibility of amending some of them with advantage, and whether they have not perceived there were deficiencies, which they, as practical men, could best supply?

The American Pharmacopœia has been of great utility in dispelling some of the mists of ignorance, which at the period of its adoption, in 1820, obscured the knowledge of many important pharmaceutic preparations, and has since paved the way for more enlightened views regarding this branch of science; nevertheless, it cannot be said to have attained perfection; just then emerging from the infancy of the art in this country, it was adequate to all our wants, but our greater experience, and the many improvements and discoveries in medicine since, render us sensible of its defects. It is farthest from our wish to disparage the abilities of the very eminent medical gentlemen, the joint production of whose labors has been a national work, generally recognised as the standard for the various medicinal formulæ employed in the curative art, suited to the wants of an American public, but we cannot refrain from expressing our opinion, that the publication of a work, destined for the use of apothecaries, as a guide for their officinal preparations, needs the assistance of a respectable representation from that body, to give it a character that will

ensure a more rigid adherence to its formulæ by their colleagues. While we would leave wholly to the physician the office of prescribing, we consider that apothecaries are better calculated, from an accustomed familiarity with pharmaceutic manipulation to indicate the manner of conducting the processes which should govern their profession. We are not singular in our opinion. It is the case all over the continent. In Germany, Spain, and in every other country except England, we have precedent before our eyes.

We find a brilliant array of names from the Paris School of Pharmacy, associated with a committee of like number of Professors of the Faculty of Medicine, in the publication of the new Codex. Distinguished Pharmaciens, like Bussy, Caventou, Robiquet, Pelletier, and Soubeiran, who are well known for their active researches in Pharmaceutic Chemistry, by their assistance in establishing new processes, suggesting modifications of old, with the view to economy, or certainty of effect, and their careful revision of the whole matter, have given at once the impress of authority to a work, to which all the apothecaries of France conform. We have not the presumption to assume for ourselves the same level of celebrity with these gentlemen, but we think there might be found some talented and intelligent members of the Philadelphia College of Pharmacy, whose weight of experience might be brought into requisition, and who, we believe, might suggest such improvements upon some of the present formulæ of the United States Pharmacopœia as would enable the framers to devise better.

The inordinate length of this paper admonishes to close here, but the subject, we trust, will not.

ART. XXVIII.—BLACK DROP. By Charles Ellis.

Notwithstanding the discovery of morphia, and its general introduction into use, there are some Physicians who prefer the old fashioned preparation of opium, called Black Drop.

It becomes important, therefore, to have an article of uniform strength; and that the directions for its preparation should be more in accordance with the modern improvements in pharmacy, than are those which accompany the original recipe. In fact, it could hardly be expected from an adherence to those directions, indefinite and vague as they are, that any certainty in the preparation would be the result. Most of our readers, we presume, are familiar with the old formula, which, with some slight alteration, was published in the first edition of the United States Pharmacopœia. The substitutes which have been offered for Black Drop, with the advantage of greater certainty in strength, are the Acetum Opii of the Dublin, and the Tinctura Opii Acetata of the present edition of the United States Pharmacopœia. But in neither of them are the wishes of those who are partial to this preparation met, as they do not produce the rich acetous syrup of opium which was the product of the original prescription.

The following directions, it is believed, will enable the Apothecary to preserve the formula in all its essential features, and to prepare Black Drop without waste of material, and of uniform strength.

℞.—Best Turkey Opium,	℥viij.
White Wine Vinegar,	Oiij.
Saffron,	℥ss.
Powdered Nutmegs,	℥iss.
Sugar,	1¼ lb.

Rub down the opium with the vinegar, previously made hot; add the saffron, nutmegs, (and if entire conformity with the original be deemed necessary,) ℥j. of yeast; digest them with

frequent shaking, for two weeks. Then throw the whole upon a displacement filter, replacing the liquor upon the ingredients until it passes off clear, which, when entirely drained off, measuring about two pints, set aside.

To the ingredients in the funnel, add, a little at a time, Oiss. of vinegar, which, if done with care, will displace the remaining saturated liquor, and thus deprive the ingredients of all their strength, at least, that it is practical or important to obtain.

The second portion of filtered liquor ought to measure considerably less than a pint, and to be equally clear with the first. To it, is to be added one pound, or if a strict adherence to the original formula is preferred, one and a quarter pounds of white sugar. Dissolve with gentle heat, and evaporate slowly to F. Oj. ℥iij., or to a sufficient extent so as to form, when added to the first infusion, exactly F. Oiij. ℥iij. of Black Drop. Thus prepared, it will contain exactly double the quantity of opium in solution, that is directed in the United States Pharmacopœia for laudanum, admitting the menstruum to be sufficient to take up all the strength of the opium.

The advantages which Black Drop, properly prepared, possesses over that by the usual method, must be evident. There is absolute certainty, if the opium is good, of having the preparation always the same; there is no waste of material, and the product is a rich, concentrated, aromatic vinegar of opium, as nearly double the strength of laudanum, as the solvent powers of the menstruum will admit of. More than this cannot be anticipated from following the unscientific directions which accompany the original domestic recipe—of boiling all the ingredients up together, and setting aside in the sun for six weeks.

The uncertainty whether the boiling would ever be twice done to the same extent, the difficulty of filtering the preparation after the sugar has been dissolved in it, and the great waste of material, the product being only about half, constitute insuperable objections to the original method, and were the causes which first directed my attention to the subject.

SELECTED ARTICLES.

ART. XXIX—ON THE INJURIOUS EFFECTS OF THE PHARMACEUTICAL TREATMENT OF DIGITALIS PURPUREA, IN FORMING ITS TINCTURE, WITH A PROPOSAL FOR A MORE EFFICACIOUS FORMULA. By M. Donovan, Esq.

The singular control which Digitalis Purpurea is capable of exercising over the circulatory system has raised it to a high rank amongst therapeutic agents.

Its effects, however, are not always equally energetic, for we frequently find it to disappoint the practitioner; and, hence, very different opinions have been entertained concerning its powers.

Such disappointments have rendered it an object with chemists to discover and isolate the active ingredients in this plant, to ascertain its properties, and to determine the means of producing from it preparations of unvarying medicinal efficacy. With this view, the Society of Pharmacy, of Paris, in 1835, offered a prize of 500 francs for the best answer to the question, "Does there exist in Digitalis Purpurea, one or more proximate principles, to which the medical properties of this plant may be attributed?" Notwithstanding the labor bestowed on the investigation at different times by several eminent persons, the subject is still involved in obscurity. In the absence of precise knowledge of the active principle of digitalis, it will be of use to point out some of the errors in the pharmaceutic management of the plant, which I conceive give origin to many of the disappointments above alluded to; to offer some suggestions as to the mode of prevention; and to introduce such improvements as have been suggested to me

by the labors of those chemists that have investigated the constitution of this important medicine. It is well known to all medical readers, that, about fifteen years since, the existence of an alkali in this plant was announced by M. Leroyer, of Geneva, to which he referred its poisonous qualities. By a process, not necessary here to describe, he separated from foxglove leaves, a bitter, deliquescent matter, which slowly restored the blue color of reddened litmus paper, and which Prévost found to be capable of assuming the form of minute crystals. To this substance the name of digitaline has been given. It possesses the properties of an active poison: a grain of it introduced into the abdomen of a rabbit, in a few minutes began to retard the respiration and circulation; at length the animal, apparently falling into a tranquil sleep, died. A solution of half a grain being injected into the circulation of a dog, killed him in fifty minutes.

Thus this substance undoubtedly contains the active principle; but it has been proved that digitaline is neither a proximate principle, nor of an alkaline nature, as will appear by comparing the experiments of Leroyer, Planiava, Dulong of Astafort, Haase, Planizza, Pauguy, Welding, Brault, and Poggiole.

Dr. Graves, of Dublin, was the first who called in question the alkaline nature of digitaline, in a paper which he placed in my hands a few months after Leroyer's announcement; and he showed that when certain precautions are taken, this substance does not manifest any alkaline reaction.

M. Dulong, of Astafort, made an examination of foxglove leaves in 1827, which convinced him that they do not contain a peculiar alkali. He arrived at the following conclusions:

1. Digitalis contains a bitter matter, which possesses peculiar properties, and which ought to be regarded as the active principle of the plant.

2. This matter does not present the characters of vegetable salifiable bases.

3. Digitalis does not contain a base analogous to strychnine, although the fact has been asserted in Sweden.

M. Dulong concludes with an important fact, which, however, has attracted but little attention. He found that this bitter active principle of digitalis, forms with infusion of galls an insoluble precipitate. Hence he concludes that watery infusions of nutgalls will act as an antidote to the poison of digitalis especially if used in conjunction with the means already known.* In 1835, the result of the experiments of MM. Brault, and Poggiole was published by these chemists. The following is the substance of their memoir:

We have often (say they) repeated all the processes to prepare this pretended digitaline, and have never yet been able to procure it. The process of M. Pauguy consists in boiling digitalis in distilled water sharpened with sulphuric acid, treating the decoction with calcined magnesia, and the dried precipitate with alcohol. The latter solution, when distilled, will deposit a white crystalline substance in small needles. Without fear of falsehood, we affirm that this process furnishes no product whatever.

We have repeated the process of M. Leroyer different times, and like that chemist we have always obtained a heavy, brown substance, possessing an extremely acrid bitter taste. This is the digitaline of M. Leroyer. Our examination has proved that this is an extract composed of a great quantity of chlorophylle, much resin, a fatty matter, and different salts of lime and potassa. M. Leroyer relates, that M. Prévost has seen crystals of digitaline by the aid of the microscope. We affirm, on the contrary, that these are salts of lime and potash which the digitalis contains.

After these reflections we have nothing to add on the labors of M. Planiava. His digitaline is nothing but an extract, composed nearly of the same principles as that procured by the process of M. Leroyer.

It results from the preceding fact, that the pretended digitaline has never been obtained; that the digitaline of M.

* Journal de Pharmacie, xiii, p. 379

Leroyer is composed of chlorophylle, resin, a fatty matter, and some salt of lime, and potash; and that the process of M. Pauguy furnishes, absolutely, no substance at all.

We may be permitted to believe that digitalis leaves are composed of chlorophylle, resin, fatty matter, amidon, vegetable fibre, gum, tannin, salts of lime, and potash, volatile oil, and oxalate of potash.

We believe, they continue, that the purgative and diuretic effects of foxglove are attributable, not to a peculiar principle, but to the union of all the substances which compose it, and especially to the resin. This resin has a bitter taste, is acrid, and almost corrosive. If one places on his tongue a very small portion of it, he experiences a very painful sensation of heat and constriction in the throat. Two grains of this resin swallowed, irritate the stomach. It is very soluble in warm alcohol; it is soluble in ether and volatile oils; insoluble in water, but soluble in water sharpened with an acid.

In conclusion, MM. Brault and Poggiole observe, that the fecula deposited by foxglove juice, has been very much employed in medicine, because the resin it contains communicates to it the properties of digitalis.*

At a meeting of the Society of Pharmacy, February, 1835, M. Pelletier stated that he had observed and confirmed the most important facts in the foregoing memoir.

From all these investigations, it is plain that in digitalis a principle or combination of principles exists, which in minute quantity, is capable of producing the deadly effects of this medicine. Leroyer says it is an alkaline; Dulong says that it is a bitter principle of a reddish-yellow color, and of an excessively bitter taste; that it softens by heat, and draws into threads like resin, becoming dry and brittle when cold; that it slightly deliquesces in the air, and that it is soluble in water and alcohol, although insoluble in sulphuric either. Brault and Poggiole conceive that the purgative and diuretic effects depend chiefly upon a resin, but also on the united agency of

*Journal de Pharmacie, xxi. p. 130.

all the other principles. Haase also supposes the resin to be the active ingredient.

In the present state of our knowledge of this subject, it is not in our power to determine which of these views is the correct one; and hence, in the modes of conservation and extraction which we employ, it is prudent to have regard, if possible, to all of them, and not to rely upon any one of them in particular. Thus were we to admit of the statement of Dulong, that the active principle of foxglove is insoluble in either, we must conclude that the choice of ether as a menstruum is improper, that the tincture formed by it is powerless, and that the active principle is excluded. Yet the French Codex, of 1816, as well as that of 1835, directed the ethereal tincture of digitalis; so also the Pharmacopœia Belgica, the Pharmacopœia Hannoverana, the Pharmacopœia Regni Poloniæ, (1817,) the Pharmacopœia Borussica, and the Pharmacopœia Saxonica; it is also sanctioned in the Pharmacopœia of Brugnatelli, in that of Cadet de Gassicourt, and of Van Mons. But if we rely on the affirmation of Brault and Poggiole, that the active principle is soluble in sulphuric ether the foregoing authorities have given adequate formulæ. Again, if the active principle is insoluble in water, as asserted by Brault and Poggiole, though contradicted by Dulong, the decoction and infusion of digitalis of the American and European Pharmacopœias are worthless; and the tinctura digitalis aquosa ætherea, added by Niemann to the Dutch Pharmacopœia, and also introduced into the Pharm. Man. Anvers, 1812, is doubly absurd, as it employs both water and ether.

In place, therefore, of relying on this or that authority, when they differ so widely as to the principle on which the medicinal powers depend, the more prudent course will be to use such process of extraction only as will deprive the subject of the greatest number of its principles, care being taken that none of them shall be excluded, unless such as are manifestly inert.

In the following observations, I shall confine myself to the

consideration of the tinctures of digitalis at present in use, reserving other preparations for some future communication.

The alcoholic tinctures of the pharmacopœial processes vary in the strength of the alcohol. In the British isles, however, that made use of is proof spirit. Let us, therefore, inquire how far this menstruum is effectual, and whether the previous treatment of the plant occasions important changes in its powers. The first step towards forming the tincture is to dry the leaves, and this process is differently directed by the colleges. We have no experiments on record of the results of various methods of drying; we are, therefore, left to draw our conclusions from analogy.

We know that in the case of some active medicines, drying, especially by heat, effects considerable changes. White briony, a highly acrid and poisonous substance when recent, becomes comparatively mild by drying; and I have found that its chemical constitution is so far altered, that although an infusion of the fresh root affords a precipitate with tincture of galls, the infusion of the root, dried, even without heat, does not. The recent root of *Arum maculatum*, if chewed, will blister the mouth, and if rubbed on the hands will excoriate them; yet, when dried, it is not only innoxious, but is used as an article of food.

The bitter cassava root "when raw, is a most fatal poison to man and beast; but prepared by fire (baking) it is very safe, and the natural bread of the Indians and several Europeans."*

Garlic is highly acrimonious; by drying it loses this quality, the same observation applies nearly to the whole onion tribe. The acrid seeds of the *Palma Christi* become mild by drying. Mezereon bark, if applied to the skin, while recent, raises a blister; but by drying, it loses this quality.

Many other instances might be adduced; it is true that they prove nothing in the case of digitalis, and they may be opposed by the known efficacy of digitalis powder when well pre-

*Stedman's Narrative, p. 382.

served. But do they not render it highly probable, that were it not for the injurious effects of drying, this plant might be much more active, much less liable to disappoint the practitioner than it is well known to be, and, perhaps, universal in its control over all constitutions?

Several more direct evidences may be adduced in support of the opinion that the powers of the growing plant are different from those of the dried leaves. When first taken from the ground, the leaves are strong, erect, and vigorous; in a short time, an hour is sufficient, they become collapsed and limber, lose their firmness, grow flaccid and droop. This is the first symptom of change. If an adequate heat be now applied, the smell of the plant is extensively diffused throughout the apartment, which proves the dissipation and loss of some ingredient of the leaves, probably the volatile oil. The brilliant green color on the surface is also changed for a dusky olive. It is not easy to conceive, that such striking changes in the physical constitution of the plant can take place without some modification of medicinal power. But if to these sources of change, we add that arising from the very bad mode of drying which the Pharmacopœias inculculate, it can scarcely be considered doubtful, that much injury is sustained. The Dublin Pharmacopœia directs the herb to be enclosed in paper bags, exposed to 90° or 100° for an hour, and then dried on a wire gauze. The London Pharmacopœia orders the leaves to be lightly stewed and hastily dried by a gentle heat. The Edinburgh Pharmacopœia merely desires, that such small quantities as can be hastily dried, shall be exposed to the moderate heat of a fire hearth; and adds the following test: "sienim eorum vires optime servantur, cujus indicium est color nativus quam perfectissime constans."

This preservation of the green color is universally admitted as the test of good drying; and when the green color is destroyed, it is conceived that the medicinal efficacy of the subject is not to be relied on. It is a convenient test, for without it we should in every case have recourse for proof to the actual exhibition of the medicine.

Now, by the process of the Dublin Pharmacopœia the color is exceedingly impaired. There can be nothing more detrimental to it than the heating for an hour in a bag, at the temperature of 90° or 100°. I have over and over convinced myself, by processes much varied, that to allow the steam of the leaves to act upon them for so long a time, or at all, is injurious to color. I have dried these leaves sometimes in paper bags before the fire, or in the sun, or air, sometimes in a baker's oven, sometimes stratified on a wire gauze over a sandbath, or on a floor in the shade, and have sometimes hung them in bundles in a room, in which burned a fire; yet in no case did I ever, by these processes, preserve the brilliant green in the leaves, which it is their nature to retain under a different management. Yet these are all the methods directed in the Pharmacopœias, and practised by herb dealers, druggists, and apothecaries. For proof of the injury done by these methods of drying, I refer to the powder of foxglove, procurable in commerce, the color of which is far inferior to that which it is possible to obtain by adopting the process which in some future communication I may describe.

It appears, therefore, that every step, from the collection to the drying, occasions deterioration. The softening of the substance of the plant when pulled, the expulsion of the volatile oil, or other odorous substances during drying, and the change of color, owing to bad methods of exsiccation, are the sensible evidences of deterioration, and they are strengthened by the analogies which have been adduced. If to these injuries we add that arising from long delays, generally a week, nay, often a fortnight, from the first collection to the final drying, there can be little doubt that the plant sustains a great deal of injury.

The following observations of a competent judge, correspond with the opinions here entertained: "Comme par le dessiccation, certaines plantes perdent une partie de leur principes les plus volatils, ou subissent des modifications dans leur nature intime, il est certain que leur action medicale ne doit pas etre la meme qu'avant leur dessiccation. On doit en

conclure qu'il est des teintures que ne jouíssent pas tonjours des proprietés prímitíves des substances dont elles sont composées. Ce fait est d'autant plus a considerer, que depuis que dessiccation des plantes a eté en grande partie confié a des perɔonnes étrangérs a la pharmacie, ces substances sont liverées au commerce dans un etat de deterioration veritablement penible a constater."*

If two tinctures be made, one with proof and the other with rectified spirit, on equal quantities of the same coarse powder of foxglove, the former will, after equal digestion, be brown, and the latter a brillant green; the taste of both will be exceedingly bitter. If the residue of both be filtered off, and an equal quantity of rectified spirit be digested on each, the residuum of that on which proof spirit had been previously digested will afford a brilliant green tincture, and the other a tincture of pale hue. Thus the green matter of the leaf is but little soluble in proof spirit, although largely soluble in rectified spirit. We do not know whether this is merely chromulite, or whether it is this substance, combined with the active principles, if there be more than one; and hence, in this state of uncertainty, it is prudent to retain the green matter. The resin, which is supposed by some to be the medicinal agent, the essential oil, the fixed oil, the fatty substance, and the bitter principle, are all soluble in rectified spirit; but we are not so certain that they are equally soluble in proof.

This point settled, the plan which I propose is easily executed; it requires no skill, and can scarcely fail, if common care be taken. It consists in plucking the proper leaves off the living plant on the spot where it grows, instantly throwing them into the strongest alcohol, digesting for six weeks, pressing out the tincture, and filtering it. Here all the sources of deterioration are obviated, and we preserve the virtues of the recent plant unimpaired.

The ratio of the recent plant to the rectified spirit may be so contrived that the resulting tincture shall correspond with

*Bulletin des travaux de la Societe de Pharmacie de Paris Octobre, 1830.

the ratio of the dried plant to the proof spirit as indicated in the Dublin Pharmacopœia. I found, from a mean of four trials, that 100 grains of digitalis leaves, of a moderate size, gathered in dry weather, and immediately dried in a well-regulated fire-heat, lost seventy-nine grains of water. The same experiments made on small leaves proved a loss of eighty-three grains for every hundred.

Thus the mean loss of leaves of a moderate and small size, is eighty-one grains, on every hundred; and the numerical strength of the dried leaves is to that of the recent as five one-quarter to one. Hence ten ounces and a half, Troy, of the recent leaves, would be equivalent to two ounces dried; and there would remain eight ounces and a half by weight, that is 8.94 ounces by measure of water. If to this quantity of water contained in the recent plant, we add 8.74 ounces of alcohol, (0.814,) we shall have seventeen ounces and a half, by measure, of proof spirit, allowing for condensation, (instead of sixteen ounces indicated in the Pharmacopœia for two ounces of dried foxglove,) which is one ounce and a half too much. But if ninety grains of powder of foxglove be added, the whole will be of the pharmacopœial strength, so far as ratio of the ingredients is concerned. But the quantity of liquid being inadequate to cover the leaves, the bottle containing the ingredients should be digested for a month, one day standing upon its bottom and the next inverted on its top. The resulting tincture will be of an olive brown color, because the red coloring matter observed by Welding will only be dissolved, and the chromulite will not. This must happen while we adhere to the ratio of the Colleges. But we can obtain a brilliant green tincture by regulating the ratio so that the menstruum will be reduced to the strength of rectified spirit, (0.840.)

In order to do this, let ten ounces and a half, Troy, of leaves be pulled from the growing plant, and plunged into a bottle, containing two pints and three-quarters (wine gallon measure) of alcohol, 0.815. The strength of the alcohol will be reduced by the water to the strength of rectified spirit,

(0.840,) and, after the proper digestion, a brilliant green tincture will result, as perfect as it is possible to procure it. The strength of this tincture, compared with that produced by the process of the Dublin Pharmacopœia, will be, so far as ratio is concerned, as one to three, and hence it might be given in three times the quantity for a dose. But as there is every reason to believe that its strength is incommensurate with this ratio, it might be prudent to begin with the same doses as have been always employed.

In this case the leaves will be covered by the alcohol; but a month's digestion in a warm place will be required, with frequent agitation.

The defects of the tincture of digitalis, made according to the British Pharmacopœias, have been fully appreciated in other countries, and we find that efforts have been made to remedy them. The ethereal tincture of the Codex Français, (both 1816 and 1834,) as well as of some other continental Pharmacopœias, is, perhaps, intended to obviate an inefficiency of the British formulæ, but the solvent power of ether on the active ingredient is rendered very doubtful by the contradictory statements which have been made on this subject.

The Dresden Pharmacopœia contains a formula, the object of which seems to be the attainment of the same advantages as are contemplated by mine. The recently expressed juice of foxglove is to be mixed with an equal weight of spirit of wine, and the mixture filtered. But the foregoing pages contain my reasons for believing it doubtful that the juice possesses all the qualities of the leaves; and that if it did, the feeble alcohol employed would not be competent to hold them dissolved. A formula for the preparation of tinctures of this kind has been given in the Bulletin des Travaux, de la Société de Pharmacie, for 1830.

In conclusion, I am compelled to believe that our tincture of digitalis is far from being the best preparation of which the plant is susceptible, and I suggest to practitioners a trial of the process given in this communication. This trial should

not be made by apothecaries in compounding prescriptions of physicians or surgeons; they are bound to the pharmacopœial process, and it would be great impropriety in them to substitute any preparation of a more active nature than is there indicated, unless with the full knowledge and approbation of the prescriber.

Dublin Journal of Medical Science, May, 1839.

ART. XXX.—ON THE PRECIPITATION OF THE PRINCIPAL METALS, BY MEANS OF SULPHURETTED HYDROGEN, FROM SOLUTIONS ACIDIFIED WITH HYDROCHLORIC ACID. By M. Hugo Reinish.

It has been hitherto believed that the salts of zinc, iron, manganese, cobalt, and nickel, were the only combinations not precipitated by sulphuretted hydrogen, from strongly acid solutions, whilst all other metals were thrown down and changed into sulphurets, even from solutions very strongly acid. I undertook a series of experiments for the purpose of ascertaining, the correctness of this opinion, and discovered that many metals, such as lead, tin, and platinum were not precipitated by sulphuretted hydrogen, when their solutions were strongly acidified, especially with hydrochloric acid.

If one part of the neutral acetate of lead be dissolved in 200 parts of water, and to a portion of this solution, 25 per cent. of its weight of hydrochloric acid, of the density of 1.168 be added, there will form, at first, a small precipitate of chloride of lead, since this salt is but slightly soluble in hydrochloric acid. If afterwards we pass through the liquid a current of sulphuretted hydrogen, no precipitate will be perceived; but if a few drops of this solution be let fall into water, an abundant precipitate of sulphuret of lead will immediately be formed. Hence it is very possible that in many analyses a

small quantity of lead has not been detected, because the liquors were too acid. This property of the salts of lead affords an easy means of separating this metal from small quantities of arsenic, copper, silver, antimony, or mercury, as these are completely precipitated in very acid solutions.

If to the before mentioned solution (1 acetate of lead and 200 water) we add 15 per cent. of its weight of hydrochloric acid, it is not precipitated by sulphuretted hydrogen, but when a little water is added, an abundant precipitate of sulphuret of lead is immediately thrown down.

The same solution mixed with 10 per cent of hydrochloric acid gives, with sulphuretted hydrogen gas, a fine red precipitate, which retains its color, and is a sulphochloride of lead.

Mixed with only 5 per cent. of hydrochloric acid, this solution of acetate of lead gives, with sulphuretted hydrogen, a precipitate, at first red, but which soon becomes brown, and, finally, black.

A solution, containing one part of acetate of lead in 500 parts of water, acts in the same manner with sulphuretted hydrogen, as that containing one part of acetate of lead in 200 of water, when the two solutions are acidified with the same quantity of acid, except that when the solution $\frac{1}{500}$ contains 10 per cent. of acid, it is still precipitated red by sulphuretted hydrogen; but the red precipitate is not permanent, and with 5 per cent. of hydrochloric acid, the solution $\frac{1}{500}$, affords at once a black precipitate with sulphuretted hydrogen.

Tin presents, under these circumstances, an interesting property. Since this metal is not precipitated by hydrochloric acid, we can render the solutions much more acid than those of lead, and thus accomplish its thorough separation from other metals, such as arsenic.

One part of prochloride of tin dissolved in 100 parts of water, was mixed with twenty-five of hydrochloric acid, and the solution treated with sulphuretted hydrogen. At first there was no precipitate formed; but in the course of time the

liquid became troubled. The same solution, with 15 per cent. of hydrochloric acid, was immediately precipitated.

A solution of protochloride of tin, $\frac{1}{100}$, acidified with 40 per cent. of hydrochloric acid was not precipitated by sulphuretted hydrogen. But when the solution, saturated with the gas, was thrown into water, a precipitate of sulphuret of tin was immediately formed. A solution of tin, $\frac{1}{30}$, mixed with 50 per cent. of acid is precipitated by sulphuretted hydrogen. A solution of $\frac{1}{300}$ acts exactly like that of $\frac{1}{100}$.

A solution of perchloride of platinum, $\frac{1}{100}$, mixed with 25 per cent. of hydrochloric acid is not precipitated by sulphuretted hydrogen.

A solution of chloride of gold, $\frac{1}{30.000}$, mixed with 50 per cent. of hydrochloric acid, is scarcely troubled by sulphuretted hydrogen. A solution of $\frac{1}{100.000}$ mixed with 50 per cent. of acid, does not exhibit any reaction.

A solution of potassa and tartrate of antimony of $\frac{1}{100.000}$, mixed with 50 per cent. of acid, is slightly disturbed by sulphuretted hydrogen. A solution of $\frac{1}{15.000}$ is still colored yellow; and finally a solution of $\frac{1}{30.000}$ does not exhibit any reaction.

Acetate of copper, in a solution of $\frac{1}{10.000}$, mixed with 25 per cent. of hydrochloric acid, is precipitated in a very decided manner. In a solution of $\frac{1}{15.000}$ with 50 per cent. of acid, it is even yet slightly troubled; but a solution of $\frac{1}{40.000}$ with 50 per cent. of acid, does not present any appearances of reaction.

One part of fused nitrate of silver was dissolved in 15.000 parts of water; hydrochloric acid was added, and immediately a precipitate was formed, which redissolved in the excess of acid. This solution, containing 50 per cent. of acid, gave, with sulphuretted hydrogen, a very notable gray precipitate. A solution of $\frac{1}{25.000}$ was even yet precipitated in a sensible manner. A solution of $\frac{1}{30.000}$ was still slightly troubled. Finally, in a solution of $\frac{1}{60.000}$ no effects were produced.

One part of arsenious acid, dissolved in 20.000 parts of water, was acidified by 50 per cent. of hydrochloric acid. This solution, submitted to sulphuretted hydrogen, gave a

notable precipitate. A solution of $\frac{1}{30.000}$ was very sensibly disturbed. Appearances of reaction did not cease except when the solution was $\frac{1}{120.000}$, acidified by 50 per cent. of hydrochloric acid. The solution of $\frac{1}{30.000}$ was not troubled by the sulphuretted hydrogen when acidified by a much greater quantity of the hydrochloric acid.

J. d' Erdman and Annales des Mines.

ART. XXXI.—NEW RESEARCHES UPON THE COMPOSITION OF THE ORGANIC ALKALIES. By M. V. Regnault.

The organic alkalies have been examined by many distinguished chemists, and their composition has been principally studied, in latter times, by M. Pelletier, Dumas, and Liebig, M. Liebig, has arrived at this extraordinary result, that all the organic bases, contain, in each atom of base, two atoms of nitrogen, and that their capacity of saturation is consequently the same as if the nitrogen existed in the state of ammonia in combination with a body which does not alter in any respect its combining power. This law which regulates the composition of vegetable bases, has been established by a great number of analyses, and is generally admitted by all chemists.

Nevertheless, if we examine, with attention, the series of salts which these bases form with acids, we will soon perceive very singular anomalies. Thus, for example, the sulphates of quinia and cinchonia, obtained by saturating these bases with dilute sulphuric acid, will be subsalts, as well as the salts obtained by dissolving them in chloric and iodic acid. The hydriodates of strychnia and brucia, obtained by dissolving these bases in an excess of hydriodic acid, or prepared by double decomposition will be, according to the analyses of M. Pelletier, sesquibasic salts. The hydrochlorates of cinchonia and quinia, obtained by dissolving these bases in an excess of hydrochloric acid and crystallising, will be bibasic salts.

The anomalies appeared so remarkable as to induce me to undertake new researches on the composition of the organic alkalies.

My researches demonstrate that the law of composition which M. Liebig believed that he had discovered in this class, and which has been generally admitted, is not exact. These bases do not always contain two atoms of nitrogen; many of them possess four atoms. Their capacity of saturation is consequently not the same as if the nitrogen existed in the state of ammonia.

All the vegetable bases, extracted from opium, contain two atoms of nitrogen, whilst those of the cinchonas and strychnos contain four atoms.

The method, equally simple and ingenious, pointed out by M. Liebig, to determine the capacity of saturation of the organic alkalies, and which consists in saturating a known weight of the perfectly dry base, with hydrochloric acid gas, and determining the increase of weight, will lead to exact results; but it requires to be conducted with great circumspection, the greater number of the bases being capable of absorbing a quantity of hydrochloric acid gas much greater than is necessary for their saturation. They do not abandon this excess of acid in vacuo, but only at a very elevated temperatnre, and that most frequently exceeding 100°. Some of them, as, for example, quinia and cinchonia, are decomposed previous to being reduced to the state of neutral hydrochlorate. In all these cases it is proper to verify the atomic weight obtained, by analysing a neutral salt prepared *via humida.*

The formulæ of the principal organic bases are, according to my analyses, as follows:—

Morphia,	$H^{40}C^{35}N^{2}O^{6}$
Codeia,	$H^{40}C^{35}N^{2}O^{5}$
Narcotina,	$H^{40}C^{44}N^{2}O^{13}$
Quinia,	$H^{48}C^{40}N^{4}O^{4}$
Cinchonia,	$H^{46}C^{40}N^{4}O^{2}$
Strychnia,	$H^{44}C^{42}N^{4}O^{4}$
Brucia,	$H^{52}C^{46}N^{4}O^{8}$

The researches which have been hitherto made upon the salts which the vegetable bases form with the oxacids, appear to prove that these salts, or, at least, many of them, may be obtained in an anhydrous state. Thus, according to M. Baup, the sulphates of quinia and cinchonia lose all their water of crystallization at 120° and remain completely anhydrous. It is the same with the sulphates of strychnia and morphia according to the analyses of M. Liebig. This latter chemist, admits, on the contrary, that the dried sulphate of quinia contains two atoms of water. The analyses of Serullas and M. Pelletier upon the chlorates and iodates, appear to show that these salts loose all their water by dessication.

The analyses which I have made of a great number of salts formed by these bases with the oxacids, clearly show that all the salts contain one atom of water, which is necessary to their composition, and cannot be taken away without their decomposition. Thus these bases exhibit a complete analogy with ammonia in their manner of acting with the acids. They combine directly with the hydracids without decomposition, and form hydrochlorates and not chlorides, as is the case with the mineral oxides; and with the oxacids dissolved in water, the vegetable bases combine, and fix one atom of water which enters intimately into combination with them. It is remarkable that the interesting bases, containing nitrogen, lately discovered by M. Liebig, contain one atom of water in most of the salts which they form with the oxacids. It is probable that their other oxysalts present an analogous composition. Finally, urea, which, from the whole of its properties, cannot be considered otherwise than as an organic base, does not make an exception to this general mode of composition, as I have perceived in the analyses of the oxalate and nitrate of urea, which, until the present time, have been considered anhydrous.

We are thus led to divide the substances which act the part of bases into two very distinct groups.

In the first group are comprised those substances which cannot combine with the hydracids without decomposition; which, for example, form with hydrochloric acid, chlorides,

and of which the salts formed by the oxacids can be readily obtained anhydrous by dessication. These are all mineral bases.

The second group comprise those bases which combine directly, without decomposition with the hydracids, and form hydrochlorates and not chlorides, and which form salts with the oxacids only when water is present. These salts always retain one atom of water, from which they cannot be separated without decomposition. This group contains all the bases of the organic kingdom, as yet known.

Ann. de Chim.

ART. XXXII.—THE FREQUENT ADULTERATION OF DRUGS; CALOMEL, EXTRACTS, BELLADONNA. By T. & H. Smith, of Edinburg.

We are happy to observe that the attention of the profession is beginning to be directed to the disgraceful adulterations to which medicines are subjected. We hope it will have the effect of rousing our brethren from the state of lethargy into which they have been so long plunged, and induce them to take the honorable position of zealous cultivators of science, in place of the more degrading one of mere shopkeepers and traders. The profession certainly owe a debt of gratitude to Dr. Thomson for the facts brought forward in his evidence before the Committee of the House of Commons; and to you, also, for laying them before the medical profession. Very important facts may also be found regarding the adulterations which are carried on in the drug trade in a very able appendix, by Professor Christison, to a Report by the College of Physicians of Edinburg, on this subject. The disclosures which will, no doubt, be elicited on this subject, however painful and annoying to individuals, must do good; no evil can be remedied until it is fully known, and it will,

therefore, be necessary, as sometimes happens in surgical cases, to use the probe, even although it should touch the quick.

Dr. Thomson, in his evidence, states that sulphate of baryta is a common adulteration of calomel, but we lately discovered a deterioration of a much more serious nature in that important remedy. A quantity of that drug, got from a wholesale London house, indicated very distinctly the presence of corrosive sublimate; we therefore washed it completely, and on drying it carefully we found that the six ounces of perfectly dry calomel which we used, had lost exactly one drachm; the solution answered to all the tests for the bichloride; we then revived the mercury, with a solution of the protochloride of tin, but from an accident that unfortunately occurred to the vessel in which the process was conducted before we could get the mercury weighed, we could not ascertain the exact quantity. Now, allowing that there was a drachm, and there could not be much less, from the quantity of metallic mercury recovered, we would have one grain of corrosive sublimate in every forty-eight of the impure calomel; a quantity, we should conceive, very likely to produce serious consequences in certain cases, when large or frequently repeated doses are given; or, at all events, very much to obscure the results of treatment. Although this deterioration cannot have been designed, the result is equally serious, and must have arisen either from the grossest ignorance, or the most culpable carelessness, and shows the necessity of allowing no one to enter into any department of the drug trade without the most searching examination of his knowledge of pharmacy, both practical and theoretical.

The evidence of Dr. Thomson regarding the inferiority of the extracts supplied to the profession is fully confirmed by the facts that have come to our knowledge. Is it not amazing, that notwithstanding the admitted superiority of the extracts prepared according to Barry's method, and which has now been so long known to the profession, it has hitherto been almost impossible to procure them, but that the ordinary

trashy, and frequently worse than useless extracts, are in regular use. With this view of the subject we recently got a vacuum apparatus fitted up, and in the preparation of extracts with it, we ascertained that the inferiority of the ordinary extracts must arise from something in addition to that arising from the way in which they are usually prepared; probably in some way equally ingenious with that of the drug-grinder mentioned in Dr. Thomson's evidence, who, out of two chests of Peruvian bark, manufactured twenty. After thoroughly exhausting a quantity of Indian rhubarb with water, we obtained 4½ ounces of extract from every pound of the root, after due evaporation of the liquid. The price charged for the extract, according to the wholesale London price list, is 10*s.* per pound; the root itself is 5*s.* 9*d.* per pound: now, it is evident that if a genuine root is used for the preparation, it ought to be 20*s.* per pound, without allowing a single penny for profit or expense incurred in making it. From 15 ounces Peruvian bark we obtained 1½ ounces of extract; however, we may say 2½ ounces, as by our method there is about an ounce of inert resinous matter separated in the course of preparation, leaving a perfectly transparent extract. The present price charged for the extract is, at a maximum, 14*s.* per pound; the bark was 3*s.* per pound some time since; now, at such a price, without allowing anything for the trouble of preparing it, the extract should be 19*s.* per. pound; but as there has been a considerable rise in the price of bark, the difference must be much more striking; we will make no comment, as the facts speak for themselves.

Another circumstance came to our knowledge which shows strikingly the evils that may arise from ignorant individuals getting into the drug trade. We employed an herb collector to procure us some belladonna for the preparation of the extract, for which she brought us a quantity of *Solanum dulcamarum*, instead of the belladonna; on informing her* that she had not brought the proper plant, she expressed

* Women are in the habit of collecting medical plants for the druggists in Scotland.

her surprise, as she had been in the habit of supplying a wholesale drug house with large quantities to be put to the same use. We will not take up your valuable space with any further remarks, but remain your obedient servants.

Letter to Editor of Lancet.

ART. XXXIII.—EXPERIMENTS WITH THE WOURALI POISON. Performed by Mr. WATERTON, at the Medical School, Nottingham.

Extracted from a Letter of W. R. Clanny, to the Editor of the Lancet.

FOR the *first experiment* a large dog was chosen. To prove the certainty of the action of the poison to destroy life, an incision was made in the side of the dog, and a spear-head, covered with the poison, inserted into the wound; this was left in the side, in order that the poison might be absorbed into the system. In about a quarter of an hour the circulatory system was much increased, the pulse rising to 130 in the minute, and the action of the heart being irregular; the creature was unable to stand at 36 minutes after the insertion of the poison; convulsive twitchings of the whole body were evident, and the pulse continued irregular up to the time of its death; at 52 minutes it ceased to breathe, but the heart continued its action; in a few minutes after the chest was opened, and the heart irritated with the end of a scalpel, but in a short time the irritability ceased.

The *second experiment* was then entered upon, and an ass was chosen for it. It was intended, in this experiment, to use *artificial respiration* during the whole of the time that the animal continued under the influence of the poison, so that when its power had ceased, the creature would resume its natural respiration, and the artificial means be discontinued, thus enabling it to survive the powerful effect of this most deadly poison. The arrow-head, covered with the poison,

was inserted into the lower part of the neck of the ass, a few minutes after nine; in about a quarter of an hour the heart began to beat irregularly; the respirations were about 15 in the minute; the pulse was accelerated, and the pupils of the eyes were dilated; in half an hour the breathing became difficult and irregular, and the pulse had risen to 104; at this moment the creature fell, as if dead, perfectly motionless, and the pulse could not be felt. An opening was immediately made into the wind-pipe, and the apparatus, which had been prepared for the purpose of carrying on artificial respiration, was applied, and put in action; this consisted of a tube, which was introduced into the opening of the wind-pipe, and a pair of bellows, which were attached to this tube; the lungs were then inflated, and afterwards emptied by pressure on the body; this action being kept on regularly and steadily, supplied the place of the natural respiration; this process was persevered in for *seven hours and a half*, at which time the animal commenced breathing by its own efforts. During this time but little change occurred in the animal; it lay motionless, and apparently lifeless; its extremities were to a certain extent cold, the respiration had ceased, and the heart beat very feebly. From the time of animation returning the animal has been gradually improving, and had eaten plentifully of hay, &c., but a degree of paralysis of the limbs exists, from the application of *strychnine*, which was used with the view of restoring it earlier from its state of temporary death, by inducing a degree of spasm. In the course of the night the tube was removed from the wind-pipe, and a quantity of mucus escaped from the wound, followed by a little coagulated blood; the wound was then closed, and respiration went on by the natural openings.

The *third experiment* was commenced on Tuesday morning. The ass chosen was younger and in better condition than the previous one. The poison was inserted in a similar manner, but only a fourth part of the quantity was used; the ass for some time suffered but little, and continued to eat hay.

The effect was evident in 34 minutes (four minutes more than in the previous experiment,) when the animal fell, senseless and motionless; artificial respiration was carried on for two hours, at which time natural respiration commenced; the ass was so far recovered at the end of six hours as to get up and stand by itself. This experiment may then be looked upon as more satisfactory than the previous one, and it shows how very much sooner the animal may be restored after having a smaller dose of the poison administered, and that its effect is much more transitory.

The advantage derived from these experiments on the lower animals, is the hope that this agent may be applied, and prove to be successful, in the cure of hydrophobia, a malady which, up to the present time, has defied all treatment; if it is brought to bear, its action appears to be to suspend animation, and so far exhaust the powers of the body as to turn out, or destroy the hydrophobic poison.

During the afternoon of Monday, to prove the virulence of the Wourali poison to a medical gentleman who had been prevented from witnessing the experiments, Mr. Waterton inserted a dart near the shoulder of a small spaniel; in about seven minutes and a half the poison began to take effect, and in nine minutes pulsation ceased.

Between the hours of four and five on Tuesday afternoon the second ass was so much recovered as to be able to carry Mr. Waterton round the room.

Since my discovery of the gases circulating in our arterial and venal blood, we have been enabled to explain the phenomena of the action of the Wourali poison in such cases.

We find that, in the first experiment, artificial respiration was not employed, and that the deleterious effects of the poison were allowed to take their course upon the sensorium commune; hence the absorption of atmospherical air into the extreme branches of the pulmonary veins was prevented.

In the second experiment, the animal's life was saved by

artificial respiration, and thus a certain portion of atmospherical air was absorbed into the systemic system.

The third corroborates the previous experiments, and requires no comment.

From the above-named discovery, made in the year 1834, we can also readily understand the manner in which the fœtus in utero receives a suitable quantity of oxygen from the parent. Time presses and I must conclude.

ART. XXXIV.—ON A NEW COMPOUND, CONSISTING OF IODIDE OF POTASSIUM, IODINE, AND THE ESSENTIAL OIL OF CINNAMON.

By James Apjohn, M. D., M. R. I. A., Professor of Chemistry in the Royal College of Surgeons, Ireland.

The compound which is the subject of the present communication, owes its origin to an unchemical medical prescription. A solution of iodine and iodide of potassium in cinnamon water, having been directed by a physician of this city, in the winter of 1837, his patient found that during the prevalence of very cold weather, the solution, which had been previously turbid, became quite clear, and nearly insipid, and, upon examining the bottle closely, he observed, deposited in the bottom, a small quantity of minute capillary crystals. These crystals were brought to Mr. Moore, of Anne street, the apothecary in whose establishment the prescription was made up, and by him to me for chemical examination and analysis. Before detailing the means which I have employed for determining the exact constitution of this substance, it will be proper to give the process by which it is best procured, and enumerate its leading properties; points, both of which were investigated by Mr. Moore and myself conjointly.

To a gallon of cinnamon water,* first reduced nearly to 32°, add four ounces of iodide of potassium and forty grains of iodine, previously dissolved in a minimum of cold water. Upon the instant of admixture the solution becomes quite turbid, owing to the production of a yellowish sediment, and this, in less than a minute, becomes crystalline, and then gradually subsides. The supernatant solution, which appears almost entirely deprived of iodine and oil of cinnamon, is now drawn off with a siphon, and the crystals and residual fluid thrown upon a single filter, which, when sufficiently drained, is enveloped in several folds of blotting paper, and transferred to a chalkstone, where, by the absorbent powers of the latter, and the occurrence of spontaneous evaporation, the product is rendered perfectly dry and pure. With the quantities stated, above 60 grains of the compound are obtained. A temperature at, or very close to 32°, is necessary to the success of this process. At 40° the brown powder, already noticed, is alone produced, and in much diminished quantity. This brown sediment, however, is identical with the crystalline product, for it may be converted into crystals simply by reduction of temperature, and I have even found it to undergo the same change when collected on a single filter, and set to dry on a bibulous stone at the temperature of 45°.

The crystals are capillary, quadrilateral prisms, without pyramidal terminations. They are of a beautiful brown or bronze color, and have a strong metallic lustre. Their taste is extremely hot and pungent, resembling closely that of oil of cassia, but partaking also of that of iodine. In alcohol and ether they are readily dissolved, and from these solvents they are again deposited with their original appearance upon the occurrence of spontaneous evaporation. They are decomposed by water, which extracts from them iodide of potassium, and causes the separation of oily drops of a dark color, which are either a mechanical mixture or a peculiar compound of iodine and the oil of cinnamon. The action of water, how-

* This water should be prepared by introducing into a still one pound of cassia bark, and two gallons of water, and drawing off one gallon.

ever, is greatly diminished when it is close to the freezing point, and appears altogether prevented when a certain amount of iodide of potassium is present.

When heated to 82°, the crystals melt into a dark liquid, from which, upon cooling, the original substance is reproduced. When heated beyond its melting point, iodine, and a vapor smelling strongly of oil of cinnamon sublime, and iodide of potassium is left behind, mixed usually with a little carbon, resulting from the decomposition of a portion of the oil. Starch would appear to decompose this substance, for with even its alcoholic or ethereal solution it forms the well-known blue compound. When agitated with water and zinc, or iron filings, an iodide of these metals is produced, and the oil is set free. With mercury the result is the same, and in each instance for water, alcohol or ether may be substituted. Potash, also, at once developes the oil, forming, as is the case of free iodine, iodide of potassium and iodate of potash.

From these facts it seems legitimate to infer that it is the oil, and not any modification of it corresponding to the benzoyle of chemists, which is associated with the iodine and iodide of potassium, and that they are all held together by an extremely feeble affinity, inasmuch as not only is the iodide of potassium separated by water, as has been stated, but the iodine is affected by a solution of potash, just as if it were free. To test the truth of this opinion, a little of the compound was decomposed in a small glass retort by the exact equivalent of a very dilute caustic alkali, and, a receiver being applied, about half an ounce of a liquid, having the appearance and obvious properties of cinnamon water, was drawn off by distillation. From it, however, I could not, though every precaution was employed, procure a particle of the original crystalline compound. The properties, indeed, of the distilled liquid were not, upon an accurate examination, identical with those of cinnamon water. Its odor, for example, was slightly different, and it reddened litmus, a circumstance from which it may be inferred to contain cinnamic acid. It is therefore not unlikely that the oil may have absorbed oxygen, or have

been otherwise altered during the distillation; and as a confirmation of this opinion I may mention that the oil of cassia, which is found in the market, is chiefly cinnamic acid, and that a cinnamon water prepared from it by a process directed in some of the Pharmacopœiæ, yields but a very minute proportion of the substance which is the subject of the present paper.

With a view to the analysis of this compound, the first point to determine was the proportion of iodide of potassium which it included. To accomplish this, a known weight of it was heated in a small porcelain capsule, by which iodine and oil of cinnamon were expelled in the vaporous state, and there remained a mixture of iodide of potassium with a little carbon, resulting from the decomposition of a portion of the oil. The iodide of potassium was separated from the carbon by solution in water, and the use of a single filter which had been previously deprived of all soluble matter by the action, first, of a dilute acid, and subsequently of distilled water. The filter being well washed, the solution was evaporated to dryness in a carefully counterpoised capsule, and then accurately weighed. The following are the results of three experiments thus conducted:

	I K	I K (per cent.)
3.37 grains gave .	0.43	12.75
8.00 . . .	1.03	12.87
9.40 . . .	1.13	12.02

The mean, therefore, of the numbers in the third column, or 12.55,* is the quantity of iodide of potassium as obtained by me in 100 grains of the compound.

The next step was to investigate the iodine associated, not with the potassium, but with the oil, and, to effect this, the following was the course first pursued:

A known weight of the compound was decomposed by a slight excess of an alcoholic solution of potash, and the whole

* This contains 9.58 grains of iodine.

was evaporated to dryness, by which the oil was partly volatilized and partly decomposed. Heat was now cautiously applied, so as to reduce the iodate, which I have already stated to be always formed in such experiment, to the state of iodide of potassium, but not to volatilize any of the latter salt. The residue, first permitted to cool, was treated with distilled water, and passed through a filter to separate the carbon. The filter was well washed, and the solution, having been reduced to a small bulk by evaporation, was precipitated by nitrate of silver, and the iodide of silver, first edulcorated three or four times with cold distilled water containing a few drops of ammonia, was finally dried, melted, and weighed.

In an experiment, in which 10.33 grains of the compound were employed, the iodide of silver amounted to 7.41 grains, equivalent to 3.95 of iodine, or 38.24 for 100 grains of the compound. Now, if from this we substract 9.58, the iodine in the 12.55 grains of iodide of potassium which we have already found to exist in 100 of the compound, we shall get for the per centage of iodine, in union with the oil, the number 28.66.

Fearing that the heat applied in reducing the iodate of potash to iodide of potassium, might have either been insufficient for the purpose, or have volatilized some of the latter salt, I recommenced the estimation of the amount of free iodine, or rather of that united to the oil, by a somewhat different process.

A known weight of the substance was introduced into a test tube with water and zinc filing, and the other end being drawn out at the spirit lamp, it was hermetically sealed, so as effectually to prevent the volatilization of iodine. Agitation was now resorted to, and a gentle heat at the same time applied, which caused the separation of the oil, the iodine previously combined with it having entered into union with the zinc, and formed with it a salt dissolved by the water. The tube was now broken, and its contents having been thrown upon a single filter, previously deprived of all soluble matter,

distilled water was poured on until the entire quantity of the iodide of zinc was carried through. The washings were concentrated, suffered to cool, and then treated with the equivalent quantity of nitrate of silver, and the resulting precipitate (iodide of silver) having been, as in the previous experiment, sparingly washed with cold water, containing a little ammonia, was dried and weighed. From this the total quantity of iodine in the compound, both that combined with the potassium and with the oil was collected. But the quantity in the former state having been already ascertained, the difference is the quantity of iodine associated with the oil.

In an experiment thus conducted, 6.55 grains of the substance yielded, of iodide of silver, 4.52 grains, equivalent to 37.20 grains of iodine for 100 of the compound. Subtracting from this 9.58, the iodine of the iodide of potassium, we obtain, as the representative of the amount of this element associated with the oil, the number 27.62. Hence $\frac{28.66+27.62}{2}$ $=28.14$, is the mean amount of the iodine in the latter state of combination, as derivable from both experiments. But $\frac{28.14}{9.58}=2.93$, or $9.6=3$. We thus arrive at the conclusion that for every atom of iodide of potassium in the substance under consideration, there are three atoms of iodine in combination with the oil of cinnamon.

Before leaving this branch of the analysis, I may observe that the iodine of the oil may be directly obtained by decomposing the compound in a glass tube, at a red heat, in contact with lime, and acting upon the residue with water, which dissolves the iodide of calcium, and along with it a little lime. The latter being separated in the usual manner by carbonic acid and boiling, the former may be precipitated by oxalate of ammonia, and the iodine estimated from the amount of carbonate of lime afforded by the oxalate when calcined at an obscure red heat.

The experiment made upon this plan did not give a very satisfactory result; and, when I considered the great dispro-

portion between the atomic weights of iodine and of lime, I did not feel disposed to repeat the process.

The iodine may also be taken out of the compound by filings of iron, as well as those of zinc, in the form of iodide of the metal; and, though the theoretical objection just stated to the process by lime, is equally applicable to this method, a single experiment, whose particulars I subjoin, thus conducted, led to a conclusion corresponding very closely with that already obtained.

Eight grains of the compound gave 0.72 of peroxide of iron. But this amount of peroxide corresponds to 2.27 of iodine. Hence

8 : 2.27 :: 100 : 28.41 — the

per centage of iodine associated with the oil, and which exceeds the result, 28.14, obtained by the other methods by a quantity so small, that it may be viewed as affording a corroboration of the correctness of the previous determination.

Having determined the iodide of potassium and the iodine in union with the oil, we can now state the composition of the compound, assuming the residue to be oil of cinnamon.

Iodide of potassium, . .	12.55
Iodine, ...	28.14
Oil of cinnamon, . . .	59.30
	99.99

That it is the oil itself, and no oxidized or other modification of it, which exists in this compound, I have already assigned reasons for believing; and as, by the application of such heat as will fuse the compound, no water is set free, it becomes highly probable that the statement above made is a correct representation of its constitution. But the oil of cinnamon has been analysed, and through the researches of Dumas we are acquainted with its real composition, which he has shown to be represented by the formula $C_{18}H_8O_2$. If then the view, numerically expressed above, be the true one,

the 59.30 parts of oil must correspond to some integer, or at least simple number of atoms. And, reciprocally, if we find such to be the case, we shall be fortified in the conclusion which we have drawn.

With a view to this method of verification, let the numbers which represent the iodide of potassium and iodine, and that which is supposed to represent the oil, be divided by their respective atomic weights, and let the quotients be reduced to others in the same ratio, and so that the iodide of potassium may be represented by unity. When these arithmetical operations are performed, we obtain the numbers in the second and third columns of the following table, the former being the quotients themselves, and the latter other numbers bearing to each other the same proportion.

	(1.)	(2.)	(3.)
Iodide of potassium, .	12.55	0.075	1.000
Iodine, . . .	28.14	0.223	2.973
Oil of cinnamon, . .	59.30	0.442	5.893

The numbers, it will be seen, in the last column approximate so closely to the integers 1, 3, and 6, as to leave little doubt that the true empirical formula is

$$IK + I_3 + Cin_6,^*$$

a conclusion which is strikingly confirmed by the following statement of the composition of our substance in 100 parts calculated upon this hypothesis:

Iodide of potassium, . .	12.26
Iodine, ...	28.08
Oil of cinnamon, . . .	59.66
	100.00

To apply, however, to this conclusion, the most decisive test, it remained to burn the substance with oxide of copper,

* Cin is assumed as the symbol for the oil of cinnamon.

and see whether the carbonic acid and water thus obtained would correspond with the amount of oil of cinnamon ascribed to the compound.

7.08 grains, Liebig's apparatus for potash being employed, yielded, of carbonic acid, 12.70 grains, and of water 2.60, equivalent to 3.513 carbon, and 0.288 hydrogen. But, adopting for a moment the empirical formula already arrived at, the 7.08 grains of the substance would contain 4.223 of oil of cinnamon. If, therefore, from this we deduct the carbon and hydrogen, we obtain the oxygen, and find the constituents of the oil as as follows:

Carbon, ...	3.513
Hydrogen, ...	0.288
Oxygen, ...	0.420

If these be divided by the atomic weights, and if, also, we substitute for the quotients numbers in the same ratio with them, that for carbon being assumed 18, we obtain the following:

Carbon, ...	18.00
Hydrogen, ...	8.82
Oxygen, ...	1.60

As the conjoint result, therefore, of our analysis and our hypothesis, we find the formula for oil of cinnamon to be $C_{18}H_{8.82}O_{1.60}$. Now this is so close to the formula of Dumas, viz.: $C_{18}H_8O_2$, particularly when we consider that owing to the fusibility of the compound, and the facility with which it is decomposed, heat could not be applied in drying the contents of the tube before the commencement of the combustion, and that consequently the hydrogen must have been too high and the oxygen too low,—considering this, I say, the accordance is so close as to leave no doubt that the empirical formula already given, correctly represents the constitution of the compound submitted to analysis. It is scarcely necessary

to say that the most probable rational formula is that here subjoined:

$$IK + 3\,(I + Cin_2.)$$

From the analysis which I first performed, and of which I gave a brief account in the Chemical Section at the Liverpool Meeting of the British Association for the Advancement of Science, the formula deduced was

$$IK + 2\,(I_2 + Cin_3,)$$

which differs from the preceding merely in containing one more atom of iodine.

This compound appears interesting under many points of view. In the first place, it is one of considerable complexity, is decomposed with an extreme facility, and is nevertheless perfectly definite in its composition, and even beautifully crystallized.

In the second place, it is a kind of double salt, composed of two haloid salts, in one of which the oil performs the very unusual function of an electro-positive or basic metal,—a circumstance the more singular, as Dumas has shown that it unites also to the muriatic and nitric acids, forming with them binary compounds, the latter of which very readily crystallizes. The oil, in fact, thus appears to act the part of a metal as well as of an oxide.

Lastly, I may observe that the method by which our compound was first accidentally formed, and is still best made, presents an instance of incompatibility which had not been previously suspected, and will, no doubt, suggest to chemists experiments which will eventuate in the production of a series of similar substances. In reference, however, to this latter point, I should add that Mr. Moore has applied to the other aromatic waters the very process which succeeds with cinnamon water, but without obtaining a trace of any new product. It is possible, however, that new results might be obtained by substituting other metals for the potassium, and replacing

the iodine by bromine, or even chlorine; and I have, indeed, myself commenced some experiments, with a view to this research.

Lond. and Edin. Phil. Mag., and Journ. of Sci.

ART. XXXV.—ORIGIN OF THE ERGOT OF RYE.

By Edwin J. Quekett.

In the Lancet, of the 22d of June, is a paper, signed "F. B.," in which it is asserted that I have assumed to myself the credit of discovering ergot, which credit, it is said, is due to my friend, Mr. Smith, of the Royal Botanic Gardens, Kew. I shall, therefore, feel obliged by your insertion of the following; though I do not consider myself bound to answer anonymous correspondents, yet, as I am represented to have acted unhandsomely towards an individual for whom I have always entertained the greatest respect, both for his talents as a botanist, and his personal kindness to me, (which feeling of respect appears mutual, if I may judge from his last letter to me, dated June 3d, 1839,) therefore I cannot consent to remain silent.

It appears somewhat strange that "F. B." should have allowed Mr. Smith's claims to slumber for eight months, more especially as during this time I have often met Mr. Smith, who has never once opened his lips to me on the subject.

To explain the matter, I must state, that when at Kew Gardens, in the summer of 1838, Mr. Smith pointed out to me the "elymus sabulosus," a grass, as being ergotised; and as I, as well as he, doubted the opinions hitherto entertained of its nature, I was glad to have the opportunity of examining it in the recent state, and begged a few spikes of the grass (not "the fluid" only, as F. B. mentions,) which I told Mr. Smith were for the purpose of investigating the matter. The

specimens were kindly given me, and Mr. Smith did not say he was, or had been working, at the subject, more than watching the grass externally, and he told me that he conceived the liquid on the spike (the "certain fluid" of F. B.) to be deposited or produced by a peculiar fly that was often seen on the grass, and which fly he imagined to be more or less connected with the formation of the ergot, as the cynips is with the nut-gall.

About a week after, having examined, by the aid of the microscope, the specimens I myself brought from Kew, I wrote for more, and mentioned that "I had discovered the whole secret," as I then thought, for I had found the fluid to consist of sporules, which could not be any excrementitious fluid of a fly; which sporules, sporidia, or jointed bodies, were, I conceived, the reproductive particles of a fungus,—of what kind I then had not made out.

In a letter sent me by Mr. Smith, bearing date of October 15, 1838, my request is acknowledged, and he offers to bring me the specimens to my house, which was done, and in the same note he mentions that he had not seen the fly lately, but had collected the fluid, and found sporules also, in which he meant to steep grains, for the purpose of making them produce ergots when they grew to perfection. When Mr. Smith was with me, I showed him specimens of the ergot under my own microscope, and pointed out that the relation of the ergot to the styles and scales, at the bottom of the flower, was precisely that of the healthy grain, and neither of us at that period knew how to account for the sporules in any way being capable of producing an ergot.

I heard nothing more of Mr. Smith's investigations till we met at the Linnæan Society, on November 6, when a paper was read on the ergot by Mr. Smith, the printed abstract of which F. B. has published in full. After the reading I believe I uttered the words to Mr. Smith, "you are wrong" (which F. B. seems to be acquainted with,) because I did then differ in opinion from some of the points in that paper.

Now the truth must be told, that the abstract of Mr. Smith's

paper, published in the "Proceedings of the Linnæan Society," does not contain all the opinions that gentleman entertained at that time; for, after his description of the fungus, and his discovery of it in the *anthers*, and his opinion that it caused ergot by communicating disease to the grain, he mentioned that these minute joints became *animated*, or, in other words, animalcules, when kept for a short time in the liquid that was obtained from the plant which contained them; which fact is in opposition to his former discovery; for one being cannot belong to two kingdoms, and I expressed my opinion on this and other points; and, as F. B. seems to recollect, I uttered the words "I am sure you are wrong."

In the interval between the meeting of the Linnæan Society, on the 6th of November, and that of the 4th of December, I carried on my examinations into the cause and structure of ergot; and at the meeting of the Society held on the evening of the latter date, I am accused of adopting Mr. Smith's views in the paper that was then read. I confess I did adopt his views of the nature of ergot, but I did so without borrowing his discovery of the fungus on the anthers to convince me; and it was by patient investigation, and experiments of a delicate nature, that I arrived at the conclusions I did, which took three weeks of continued examination to complete, and which substantially proved what I then considered had only previously been partially done.

These observations are recorded in another place, and are not required to be gone through again in the present instances; suffice it to say, that they consisted in proving that the external particles of the ergot were not animalcules, but sporules of a fungus, which I succeeded in causing to germinate, going through all the various states, from the commencement to the perfect state of a plant, up to its development of similar bodies to those from which itself was produced; which series of observations incontestably proved that the fungus was a separate plant from the grain, and I considered I had as much right to make known my discovery of the independent germination of the

sporules, as a proof of the nature and origin of ergot, as what Mr. Smith had by his finding the fungus on the anthers.

I am accused by this anonymous writer of not giving Mr. Smith his share of the credit of the discovery of the origin of ergot, either in my paper or in the abstract; but the fact is, Mr. Smith's paper had been read and spoke for itself; and in the "Proceedings" both papers appeared as abstracts; and if I did not put forth what that gentleman discovered, I mentioned the essential matter of his observations. But I feel that some apology is due to him for leaving his name out of my account of the ergot, inserted in the "Medical Gazette" of the 19th of January, which was done inadvertently from a desire of brevity, and not with a view of wishing to take from him any share of credit to which he is entitled for his observations.

According to F. B. the credit which he wishes to claim for Mr. Smith is the discovery "that the ergot is not a fungus, but a diseased grain, occasioned by the growth of a fungus, not previously detected." But it is fair to other botanists, who have examined the nature of ergot, to state their discoveries and opinions before this claim is adjudged to any individual in particular.

And if F. B. reads Fries's description of *Spermoëdia* he will find that he considered it the diseased grain of grasses; and in a note in the "English Flora," (Vol. v., Part ii., p. 226,) Berkeley entertains the same idea. If F. B. reads Phœbus's account in the "Deutschlands Kryptogamische Giftegewächse," 1838, he will find the ergot figured as a diseased grain correctly, and also the sporules of the fungus of F. B., "not previously detected," are there also figured with extreme accuracy; and it is also there stated, as well as in Christison's "Treatise on Poisons," (3d edition,) that Wiggers could produce ergot by infecting healthy grains with the seeds (sporidia) of the fungus; and in Philippar's "Treatise on the Nature and Origin of Ergot" the *viscid juice* is described, its supposed origin is pointed out, and its containing numerous sporules is also related; he goes farther, and figures the sporules, and gives a drawing of the fungus on the *anthers* cementing them together into one

mass, and occasionally calls the ergot an "ergotized grain;" but still in these several descriptions all but the discovery is made out, and some credit is to be given to these individuals for their observations, which I myself, and I believe Mr. Smith, likewise, were ignorant of whilst investigating the subject.

To Mr. Smith, I will say, is due that share of the discovery in which he proved and described what Berkeley and others previously imagined, viz.: that the body known as ergot was not a fungus, but a diseased grain, and I reserve for myself the substantiating of his views by a different and more perfect proceeding; and also as being the first to observe the parasitic fungus to develope throughout all its stages up to maturity, and to arrive at a perfect plant, unconnected with any part of a grass; which fungus being new and undescribed, I considered I had the privilege of naming *Ergotætia*, and did think of taking the specific name of it after Mr. Smith, as "F. B." mentions, on account of my respect for him, and also because he was the first that I was then aware of to detect it in a place where it was not before observed, which fact went a considerable way towards pointing out the true origin of ergot; but by the advice and suggestion of a mutual friend, Mr. N. B. Ward, of Wellclose square, I adopted the term *abortans*, for reasons which "F. B." has assigned; and had I any doubt of Mr. Smith's share of the discovery, is it probable that I ever should have proposed his name as being fitted to form the specific one of the newly discovered genus?

I trust, from what has been said, that I have acted in no way to deprive Mr. Smith of his claims; and, in fact, here I allow them; and if I did not speak of them so fully as he wished, I did not deny them, or speak in any way against his discovery in my paper.

There is one more point that I must take notice of:—F. B. remarks, that I "may, by subsequent observation and research, have developed some minutiæ which do not appear in the paper of Mr. Smith, is what might be expected, and need not be denied." Now great care is taken to withhold the nature

of these minutiæ, and, in fact, these minutiæ are all that I do claim, being the development of the fungus, apart from the plant, and proving that the bodies in the interior, which had been supposed to be sporules of the fungus, are nothing but fatty particles, incapable of producing ergot, being, in fact, the most substantial of the proofs that the ergot is a diseased grain, and not a fungus, containing sporules, as Philippar, and previous investigators, had imagined.

I am sorry to be obliged to make this public reply to accusations brought against me by an anonymous correspondent, but I trust that nothing I may have said will prove offensive to Mr. Smith ; and I beg to assure that gentleman (for whom I, as well as many others, have always entertained the greatest respect,) that nothing do I here state with the view of depreciating his abilities, or wishing to detract anything from his merits : and I do hope that Mr. Smith and F. B. will feel satisfied with this explanation. At the same time I must remark, that should a further correspondence be entered into, I shall not take notice of any more *anonymous* communications, and have to express my regret that I have taken up so much of your valuable pages in refuting accusations brought against me.

Letter to Editor of Lancet.

ART. XXXVI.—ON NARCOTINE AS A SUBSTITUTE FOR QUININE IN INTERMITTENT FEVER. By Dr. O'Shaughnessy.

On the 4th of August, 1838, at the meeting of the Medical Society of Calcutta, Dr. O'Shaughnessy laid before the Society the details of thirty-two cases of remittent and intermittent fevers treated by narcotine as a subsitute for quinine, and of which thirty-one were cured. The cases previously described in the First Report of the Pharmacopœia Committee were twenty-seven, making on the whole sixty, of which the narcotine was successful in all but two.

The cases now communicated were as follows :—

Two cases by Dr. Goodeve; one of them the case of the late deputy-collector of Chittagong. Quotidian of several months' standing; spleen enlarged. Quinine was used without success, although given in every possible form. Arsenic was then tried and checked the fever, but did much mischief to the patient's general health. Narcotine was then employed, and with such success, that Dr. Goodeve concludes thus:—"I do not hesitate in saying that this patient owes his life to the remedy in question." The other case was a patient laboring under inflammation of the bowels at the same time, where the administration of quinine would have been inadmissible.

Three cases are reported by Dr. Smith, of Hidgelee, who adds, "As far as these three cases go, I cannot speak too favorably of narcotine, and am very desirous of trying it more extensively." Captain Marshall, of Calcutta, communicated three cases of severe ague occurring among his servants; all were rapidly cured; and Captain Marshall says, "It would be presumptuous in me to offer any opinion as to the virtues of narcotine; all I can say is, that if ever I am ill of fever I shall unhesitatingly and confidently prefer it to sulphate of quinine, or any other medicine I know of."

Mr. R. O'Shaughnessy described the case of a man on whom he had operated for stone, and who was attacked by

violent ague on the day of the operation. The ague returned next day at the same hour. Mr. O'Shaughnessy considered it unsafe to employ quinine under these circumstances, and had recourse to narcotine. Four doses of this medicine were given, and Mr. O'Shaughnessy states, "The fever did not return; the wound was not in the slightest degree affected; there was no excitement or headach produced. After he took the first dose he slept soundly, which he had not done the two previous nights, and he was discharged cured of the effects of the operation on the fourteenth day after its performance."

Mr. O'Brien, the apothecary of the Native Hospital, reported three cases; Mr. Evans one; the Pundit Modoosoodona Gupta one, all successfully treated. The Pundit's patient labored under dysentery at the same time.

Dr. J. Chapman, assistant-surgeon of the Calcutta General Hospital, related the case of a European who contracted violent remittent fever at Kedgeree, on the 16th of July, and was received in hospital on the 19th. Quinine was used in the usual manner on the first remission on the 20th, and again on the 21st, but the symptoms were rather aggravated than improved. The narcotine was then given, and its use was speedily followed by a complete remission. From that time the fever did not return, with the exception of restlessness and slight headach on the evening of the 23d. On the 28th all medicines were omitted, and the patient was discharged convalescent.

Dr. O'Shaughnessy further submitted two cases, treated in his own house among his servants, both of which were cured. Lastly, he communicated fifteen cases, extracted from the journals of the Medical College Hospital. In five of these cases quinine and arsenic had failed, in eleven there was enlargement of the spleen or liver, in one inflammation of the knee-joint. Seven of these cases were remittents, and two of these had died. Of the two fatal cases one was admitted on the seventh day of violent fever and died next day. In the second (a child) the spleen, liver, pancreas, and mesenteric

gland were immensely enlarged, and the case hopeless from the beginning.

Dr. O'Shaughnessy added that, besides the sixty cases now recorded, more than one hundred ague patients had been treated by his pupils and acquaintance with perfect success by this remedy.

[In a subsequent number of the "India Journal" the following letter appears, addressed to Dr. O'Shaughnessy, by Mr. Green, civil surgeon, Howrah:]—

"I have now employed the narcotine in sixteen cases of remittent fever, and such is my opinion of the efficacy of the remedy, that in instances of fever, intermittents and remittents, in ordinary healthy subjects, and in whom there is no complication of severe organic disease, I give it with the full expectation of arresting the next periodic return of the fever. I have seen this result follow in ten of the cases of the fever alluded to. I consider narcotine a more powerful antiperiodic than quinine. The remedy does not act silently. I have observed a degree of general heat follow its use in the first instance, and, subsequently, perspiration; so that it appears to excite in the system a salutary and powerful counteraction as to stop the morbic concentration that issues in fever. I have not observed narcotine to lead to local organic disturbance in the cases in which I have used it. In short, even from my scanty experience, I consider the remedy an invaluable one."

Indian Journal of Medical Science.

ART. XXXVII.—ON CINCHONA. Extracted from the Lectures of John Pereira, Esq., F. L. S.

Published in the London Medical Gazette.

The family *Rubiaceæ* of Jussieu, Decandolle, and others, has, by Mr. Lindley, been divided into two families, termed *Stellatæ* or *Stellaceæ*, and *Cinchonaceæ*. Stellatæ are distinguished from Cinchonaceæ by their angular stems and whorled leaves, destitute of stipules. Moreover they are natives of the colder, while Cinchonaceæ belong to the hotter parts of the world.

CINCHONACEÆ.

Characters.—The plants of this family are trees, shrubs, or herbs: their leaves are simple, entire, and opposite, with interpetiolary stipules. The inflorescence varies, but is usually a panicle or corymb. The calyx is monosepalous, superior, and either entire or divided. The corolla is monopetalous, superior, tubular, and divided; its modifications of æstivation being various. The stamina are usually five in number, and arise from the corolla, with the segments of which they alternate. The ovarium adheres to the calyx, has two or more cells, and is of the kind called inferior: it supports a single style, with a simple or divided stigma. The fruit is inferior; the seeds are albuminous.

Cinchona.

Characters.—This genus is characterized as follows:—The corolla is superior, five-toothed, and persistent. The corolla is infundibuliform, or salver-shaped, with a five-parted spreading limb, and valvate æstivation; the stamina are five in number, and are inclosed in the tube of the corolla; the ovarium is inferior; the stigma bifid. The fruit is a many-seeded capsule, with a septicidal dehiscence. The seeds are flat, or peltate, with a membranous laciniate margin.

According to Decandolle, no less than eight genera (including forty six species) have been confounded under the name of Cinchona: they are, Cinchona properly so called, Buena (called by some botanists Cosmibuena,) Remijia, Exostema, Pinkneya, Hymenodyction, Luculia, and Danaïs. The same authority also states that the first of these genera (Cinchona properly so called) is distinguished from the others by the following characters:—1st. The stamina are entirely concealed within the tube of the corolla, and never project beyond it. 2dly. The fruit consists of two cocci, or carpella, which adhere to the calyx; it has a septicidal dehiscence from below upwards. 3dly. The seeds are erect, and imbricated on each other, from below upwards. 4thly. The limb of the caylx is toothed only to a third or half of its length, and is persistent at the summit of the capsule. Mr. David Don has also pointed out another character by which some of the genera may be distinguished—namely the form of æstivation. Thus, in the genera Cinchona and Pinkneya, the æstivation is valvate. In Buena, Lasionema (a genus formed by Mr. Don, to include the plant formerly termed Cinchona rosea,) and Luculia, it is imbricated; in Exostema it is induplicate; and in Hymenodyction it is plated.

Species of Cinchona.—In botanical writings great discrepancy exists as to the real number of species of this genus. Thus Humboldt makes eighteen; Poiret twenty-four; Sprengel fifteen; Lambert seventeen; and Decandolle sixteen. This has arisen partly from the confusion of genera, and partly from the difficulty of determining what are real species and what only varieties. Thus the shape of the leaves, which has been used by some botanists for the distinction of species cannot be relied on; and "whoever," says Humboldt, "determines single specimens of dried collections, and has had no opportunity to examine or observe them in their native forests, will, as is the case with the Bronzonetta papyrifera, be led to discover different species by leaves which are of one and the same branch." Moreover, great uncertainty exists as to the species yielding the Cinchona barks, as I shall show when

speaking of the barks individually. These reasons induce me to omit any notice of individual species.

Geography.—It is a most remarkable circumstance, that hitherto no Cinchonas have been found except in Peru and Colombia. Some writers, indeed, have described plants which they have termed Cinchonas, growing in other parts of the world, but subsequent examination has shown them to belong to other genera. Thus three species of Remijia, growing in the Brazils, have been described and figured by M. Aug. de Saint Hilaire, as species of Cinchona. The Cinchona *excelsa* of Roxburgh, a tree growing on the coast of Coromandel, is now placed in the genus Hymenodyction. The Cinchona *Caroliniana* of Poiret, is in fact a species of Pinkneya.

The true Cinchonas extend from 20° south, to 11° north latitude, on the Andes, at varying elevations. It is difficult to assign limits to these elevations, since the statements of Humboldt on this subject are not uniform. Thus the lowest true Cinchonas are variously stated, by himself and Kunth, to grow at an elevation of from 200 toises (1200 feet) to 359 toises (2154 feet;) while the highest are said to grow from 1487 toises (8922 feet) to 1680 toises (10,080 feet.) The temperature of the Cinchona districts necessarily varies with their latitude; perhaps the average is about 68° F.

Method of obtaining Cinchona barks.—"The Indians," says Mr. Stevenson, "discover from the eminences where a cluster of the trees grow in the woods, for they are easily discernible by the rose-colored tinge of their leaves, which appear at distance like bunches of flowers amid the deep-green foliage of other trees. They then hunt for the spot, and, having found it out, cut down all the trees, and take the bark from the branches:" and he adds, "after the Indians have stripped off the bark, they carry it in bundles out of the wood for the purpose of drying it."

This account of the method of procuring these barks is somewhat different from that published many years ago by Mr. Gray, from the papers of the late Mr. Arrot. The latter tells us that the bark is cut from the trees as they stand. Every

two Indians take one tree, from which they cut or slice down the bark with a large knife "as far as they can reach from the ground; they then take sticks about half a yard long each, which they tie to the tree with tough withs at proper distances, like the steps of a ladder, always slicing off the bark as far as they can reach, before they fix a new step, and thus mount to the top, the Indian below gathering what the other cuts." It is afterwards carried in bags to the low country, where it is spread out and carefully dried.

The proper period for cutting the bark is the dry season. Arrot says this is from September to November. Ruiz, however, states that violent rain continues from October to May, when the fine weather commences, and continues to September.

In order to know whether the stems and branches are sufficiently mature for barking, Ruiz says one or two stripes are cut off with a knife, and exposed to the air. If within three or four minutes the inner side of these stripes, as well as the part of the branch deprived of bark, begins to turn red, it is an infallible sign of maturity, and *vice versâ*.

When we take into consideration the immense consumption of Cinchona bark, (Pelletier alone in one year consumed 2000 quintals, equal to 200,000 lbs. of yellow or Calisaya bark, in in the manufacture of the sulphate of quinia;) that the trees yielding it are confined to one part of the world; and that no care is taken of their preservation; it is not at all improbable that in a few years this valuable drug may totally disappear from commerce. Indeed a report has been prevalent among the drug dealers, that the *Cascarilloes*, or bark collectors, had arrived at the limits of the forests containing the yellow or Calisaya bark, but whether this be true or false, I know not. I am acquainted with one dealer who has laid in a large stock, on the speculation of the truth of this report.

"If," says Mr. Stevenson, in his Travels in South America, "the government of America do not attend to the preservation of the quina, either by prohibiting the felling of the trees, or obliging the territorial magistrates to enforce cutters to guard them from destruction, before a sufficient population

will allow of those tracts of woodland becoming personal property, this highly esteemed production of the new world will be swept from the country." What Condamine asserts is highly probable, that both old and young trees die from the scaling of the bark, whether they are cut down or not; but Bollus and Arrot assert the reverse: the former states that Cinchona trees may be frequently seen deprived of their bark without suffering any detriment; and the latter tells us that from 18 to 20 years are required for a Cinchona tree to produce a new bark. When the trees are cut down, Mr. Stevenson tells us that the roots generally sprout, but "no trees of any large size grow up, for they are either smothered by the lofty trees which surround them, or else they are choaked by other young trees which spring up near them, and are of quicker growth."

Physical properties of the Cinchona barks.—Under this head I propose to examine the *structure*, the *quilling*, the *color*, *taste*, and *odor*, the *fracture*, and the *cryptogamic plants*, found on the Cinchona barks of commerce.

Structure.—Those barks known to druggists by the name of *coated* barks consist of the following parts—an epidermis, the rete mucosum, and cortical layers, (the innermost of which is termed the liber.)

(a) Epidermis.—This is the most external portion of the bark, and is variable in its thickness. The barks of commerce are said to be *coated* (*Cinchona cum cortice exteriore* of Bergen,) when the epidermis is present, but when this is absent, and when also part or the whole of the next layer (rete mucosum) has been removed, such barks are called *uncoated* (*Cinchona nuda* of Bergen.) As the epidermis is useless, or nearly so, in a medicinal point of view, uncoated barks are to be preferred, since the epidermis increases the weight of the bark, without adding any thing to its real value. In reference to this layer, there are several characters deserving of attention in judging of the quality of bark: thus Cinchona barks, with a whitish epidermis are, I believe, for the most part, inferior to those in which this layer is brown. But you must not mistake a whitish coating

given to a brown epidermis by some crustaceous lichens, for a genuine white epidermis. The term *warty* or *knotty* (*Cinchona nodosa* of Bergen) is applied to those barks in which we observe prominences on the epidermis, corresponding to elevations on the subjacent parts. These are frequently observed in some specimens of red bark, as well as in the kind called Huamalies. Barkis termed *cracky* or *furrowed* (*Cinchona rimosa* of Bergen) when we observe cracks or furrows (the latter may be regarded merely as larger kinds of cracks) on it. When we observe longitudinal or transverse elevations, we say the bark is *wrinkled* (*Cinchona rugosa*.)

(*b*.) *Rete mucosum—cellular envelope—medulla—externa*.—This is a cellular layer, placed immediately beneath the epidermis. It is tasteless, and is of no medicinal value. In old barks, (particularly old red bark) it is often much developed: in uncoated bark it is sometimes, though not always absent.

(*c*.) *Cortical layers* or *cortex*. These are beneath the rete mucosum, and, in fact, form the essential part of the bark. One layer is formed annually, and hence their number, and consequently the thickness of the bark depends on the age of the tree from whence it is taken. The last formed layer, that which is in the innermost, is termed *liber*. Every one of the cortical layers has medicinal virtue, but the liber the most. The reason for this will be readily comprehended by reference to the physiology of exogenous plants. The *succus communis* of these plants ascends by the alburnum, or sap wood, to the leaves, where it undergoes certain changes by the agency of the atmosphere, in consequence of which it is converted into what is called *succus proprius*, the proper juice of the plant, and in which any medicinal activity which the latter possesses usually resides. Now this succus proprius descends in the liber: hence this part may always be expected to possess the proper medicinal activity of the tree from whence it is taken.

Cryptogamic plants.—The epidermis of Cinchona barks is frequently covered, either wholly or partially, by cryptogamic

plants. These belong to four orders or families,—namely, Musci, Lichenes, Hepaticæ, and Fungi.

1. *Musci*, or *Mosses*.—We frequently find mosses on Cinchona barks; but as they are never met with in fructification, it is almost impossible to determine the genus to which they belong. They are probably species of Hypnum.

2. *Lichenes*.—These are found in great abundance, especially on the species called *Loxa* or *Crown bark* (the finest kind of pale bark.) We may conveniently arrange them according to Zenker, in four sections:

Sect. 1. *Coniolichenes*, or the pulverent lichenes (*Lichenes pulveracei.*)—In this section we have the *Hypochnus rubrocinctus* (classed among the Fungi by Fée.) I have frequently found it on the finest specimens of quilled yellow bark.

Sect. 2. *Cryolichenes* or the crustaceous lichenes (*Lichenes crustacei.*)—These frequently put on very beautiful forms, and so color the surface of the epidermis, that they appear to constitute a part of this coat. In that kind of pale bark usually called *gray*, or *silver*, the surface of the epidermis has a whitish cretaceous appearance, from the presence of various species of Arthonia and Pyrenula.

Sect. 3. *Phyllolichenes*, or the foliaceous lichenes (*Lichenes foliacei.*)—These are found most abundantly on the *Crown* or *Loxa* bark. The most common species belong to the genera Parmelia, Sticta, and Collema. The P. coronata is a beautiful species, and one frequently met with. So also the Sticta aurata, remarkable for its yellow color.

Sect. 4. *Drendrolichenes*, or the filamentous lichenes *Lichenes fruticosi.*)—The Usneas are good examples of this section: they are found in abundance on the Crown bark. Two species are met with—U. Florida, and U. barbata; a variety of the latter is curiously articulated.

3. *Hepaticæ*.—Jungermannias are found on Cinchona barks but in too broken a condition to determine their species. Fée, however, examined Humboldt's Herbarium, and found four.

4. *Fungi*.—As Fungi usually grow on weakly or dead trees,

their presence on Cinchona bark is a bad characteristic. Very few, however, are met with.

Quilling of the bark.—Bark, little or not at all curled, is called in commerce *flat bark* (*Cinchona plana.*) The absence of the curl arises from one of two circumstances,—the age of the stem from which the bark is taken, or the want of flexibility of the bark even in the fresh state. When bark is rolled cylindrically in a quilled form, it is termed *quilled bark* (*Cinchona tubulata.*) Bergen speaks of several kinds of quilling—namely, the *partially quilled* (*Cinchona subconvoluta,*) when the two edges of the quill approximate,—the *closely quilled* (*Cinchona convoluta,*) when the edges of the quill overlap each other, forming a more or less closely rolled up tube,—and the *doubly quilled* (*Cinchona involuta*) when both edges of the quill are rolled together, so as to form two cylinders, but which, seen from the back, appears as one.

Fracture.—The transverse fracture of bark furnishes an important character. Bergen admits three kinds of it: 1st. *smooth, even,* or *short fracture* (*fractura plana;*) 2dly, *resinous fracture* (*fractura resinosa;*) and 3dly, *fibrous fracture,* (*fractura fibrosa.*) Bark with a resinous fracture is usually to be preferred.

Color, taste, and smell.—Little need be said of these characters. The same kind of bark often varies in its color, while several kinds may have the same tint. Moisture usually deepens the color.

Classifications and varieties of Cinchona barks.—A *botanical* classification of the Cinchona barks I hold to be at present impracticable; and moreover, if it were practicable, it would be, in a commercial and pharmaceutical point of view, useless, since the barks are never accompanied by the other parts of the tree from which the botanical characters are drawn.

A *chemical* classification I also think cannot be at present attempted with any great chance of success. Goebel has offered the following:—

	Quantity of alkalies in a pound of bark.	
	Cinchonia.	*Quinia.*
I. *Cinchona barks containing cinchonia:*		
(*a.*) Huanuco, or grey bark,	168 grs.	
II. *Cinchona barks containing quinia:*		
1. Yellow, or regia bark,		
(*a.*) Flat uncoated pieces,		95 grs.
(*b.*) Coated thick quills,		84
(*c.*) Thin quills,		60
2. Fibrous Carthagena bark, (China flava fibrosa.)		54
3. Ash bark, (*China Jaen,*)		12
III. *Cinchona barks, containing both quinia and Cinchonia:*		
1. Red bark,	65	40
2. Hard Carthagena bark, (China flava dura,)	43	56
3. Brown, or Huamalies bark,	38	28
4. True Loxa, or Crown bark,	20	16
5. False Loxa bark,	12	9
IV. *Cinchona barks containing neither quinia nor cinchonia:*		
False cinchona barks,	0	0

This table must not be relied on, since its results do not accord with the experiments of others. We may, I think, presume that all the barks of the three first divisions contain both quinia and cinchonia, but in varying proportions. That the *yellow* or *regia bark* contains cinchonia, every manufacturer of sulphate of quinia knows.

The following is Geiger's arrangement:—

Div. 1.—*Cinchona barks, in which the Cinchonia predominates:* this includes the Huanuco, Huamalies, Ash, Loxa, and false Loxa barks.

Div. 2.—*Cinchona barks in which the Quinia prevails:* this includes the regia or yellow bark only.

Div. 3.—*Cinchona barks in which Quinia and Cinchonia are contained in nearly the same stochiometrical proportions:* here are placed the red and Carthagena barks.

An arrangement founded on the *physical* characters of the barks will be for the present, perhaps, the most useful, and is the one generally followed. In the "*Versuch einer Monographie der China*," of H. Von Bergen (a work which the late Dr. Duncan, junior, very justly described as "the most perfect specimen of pharmacography" ever published, and from which I shall draw very largely in my descriptions of the barks,) nine varieties of Cinchona bark are described, namely—

1. China rubra, or red bark.
2. China Loxa, or crown bark.
3. China Huanuco, or grey bark.
4. China regia, or yellow bark of English commerce.
5. China flava dura, or hard Carthagena bark.
6. China flava fibrosa, or woody Carthagena bark.
7. China Huamalies, or rusty bark.
8. China Jaen, or ash bark.
9. China pseudo-Loxa, or bastard crown bark.

I am indebted to the kindness of Von Bergen for illustrative examples of these and other varieties of Cinchona, by which I have been able to identify the species with those known in English commerce.

M. Guibourt, in the third edition of his "*Histoire abrégée des Drogues Simples*," has described no less than thirty-seven varieties of Cinchona barks, which he has arranged under five heads:—

1. Grey [or pale] barks.
2. Yellow barks.
3. Red barks.
4. White barks.
5. False Cinchona barks.

By an interchange of specimens, M. Guibourt and myself have been enabled to determine the synonymes of the barks

known in French and English commerce. Lectures, however, are not adapted for entering into an account of all the known varieties, and, therefore, I shall confine myself principally to those commonly used in medicine in this country, only introducing an account of others when they serve to illustrate the history of the more important ones. I shall adopt the following arrangement:---

Div. I.---Genuine Cinchona Barks.

Section 1.—Having a brown epidermis.

(*a.*) Pale barks.
(*b.*) Yellow barks.
(*c.*) Red barks.
(*d.*) Brown barks.

Section 2.—Having a whitish epidermis, (white Cinchona of some authors.)

(*a.*) Pale.
(*b.*) Yellow.
(*c.*) Red.

Div. II.—False Cichona barks.

Div. I.—*True Cinchona Barks.*

By the terms *true*, or *genuine Cinchona bark*, (*Cinchona vera*,) I mean the bark of some species of the genus Cinchona. Hitherto all these barks have been found to contain one or more of the vegetable alkalies, quinia, cinchonia, or aricina: we presume, therefore, one or more of these to be essential, and perhaps we might also add peculiar, to the genus.

The true Cinchonas are subdivided from the character of their epidermis. In some Cinchona barks, (the Carthagena, for example,) the epidermis is naturally white, has a micaceous appearance, is smooth, not cracked, and adheres to the subjacent laminæ: these are the *white Cinchonas* of some continental writers, (Guibourt, for example.) In other instances the epidermis is naturally more or less brown, cracked, and rugous. Frequently, however, it has a whitish

appearance externally, owing to the adherent crustaceous litchens.

Section 1.---*True Cinchona barks, having naturally a brown epidermis.*

To this section belong the pale, yellow and red barks of commerce. The following are the characters of each of these sub-sections:—

(*a.*) *Pale barks* (*Cinchona pallida.*)—These always occur in quills, never in flat pieces. Their powder is more or less pale, grayish, fawn color, and their taste astringent and bitter. They contain probably both alkalies, cinchonia and quinia, but the first predominates. An infusion of this bark does not affect very obviously a solution of the sulphate of soda, in consequence of containing a very small quantity only of lime in solution. In English commerce three kinds of pale barks are known, namely—

1. Crown, or Loxa bark.
2. Silver, gray, or Huanuco bark.
3. Ash bark.

(*b.*) *Yellow barks* (*Cinchona flava.*)—I use the term yellow bark in the sense in which it is employed in English and French commerce: by the Germans and Spaniards, however, the designation of yellow (flava) is given to certain barks which have a white epidermis, (namely, the Carthagena barks of English commerce,) and which, therefore, will be noticed presently. The yellow barks of English commerce occur in quills or flat pieces, the quills being, on the average, larger and much rougher than the largest quills of pale barks. The texture of yellow barks is much more fibrous than the pale; the taste is more bitter, and less astringent; the powder is orange or fawn yellow. The principal kind of yellow bark namely, the regia or Calisaya, contains both quinia and cinchonia, but the first in by far the largest quantity. An infusion of this kind of bark precipitates a solution of the sulphate of soda, in consequence of the large quantity of lime in the solution. The only yellow bark which I shall notice, is—

4. The yellow bark of English commerce, called also Calisaya or regia.

(*c.*) *Red barks* (*Cinchona rubra.*)—Red bark is met with in both quills and flat pieces: it has a fibrous texture, and a redder color than either of the foregoing kinds: it contains a considerable quantity both of quinia and cinchonia. Only one species here deserves notice, namely—

5. The red bark of commerce.

(*d.*) *Brown bark* (*Cinchona fusca.*)—This includes only one species—namely,

6. Huamalies, or brown bark.

(*To be Continued.*)

MISCELLANY.

New Metal discovered in Sweden, by M. Mosander.—M. Mosander has detected in the *cerite* of Bassnæs, the mineral in which cerium was discovered thirty years ago, a new metal to which he has given the name of *lantanum*.

The oxide of cerium extracted from the mineral by the usual means, contains nearly two-fifths of its weight of the oxide of the new metal. It is separated by calcining the nitrate of cerium mixed with the nitrate of lantanum and treating the residue with nitric acid diluted with 100 parts of water; the oxide of lantanum, which is a more powerful base than the oxide of cerium, alone dissolves in the weak acid.

The oxide of lantanum is not reduced by potassium, but this latter separates from the chloride of lantanum a grayish metallic powder, which oxidizes in water with the disengagement of hydrogen gas, and is converted into a white hydrate.

The sulphuret of lantanum is produced by heating strongly the oxide in the vapor of sulphuret of carbon. It is of a pale yellow color, decomposes water with the disengagement of sulphuretted hydrogen, and is converted into an oxide.

The oxide of lantanum is of a brick-red color; it is changed in hot water into a white hydrate, which restores the blue color to reddened litmus. It dissolves rapidly in weak acids, and forms with facility subsalts.

The salts of lantanum have an astringent taste without any mixture of sweetness. Their crystals are commonly of a rose color. The sulphate of potassa does not precipitate them except when mixed with the salts of cerium.

Digested with a salt of ammonia the oxide is gradually dissolved, the ammonia at the same time being set free.

The atomic weight of lantanum is less than that which has been assigned to cerium, that is, to the mixture of the two metals.

Acad. des Scien.

Reagent for Nitric Acid and Nitrogen, by Mr. Desbassyus.—To detect the presence of nitric acid in a liquid, several grammes of very pure concentrated sulphuric acid is to be added, and when the mixture is cool, several drops of a concentrated solution of the protosulphate of iron. If

nitric acid be present, the liquid immediately assumes a rose or even purple color, and such is the sensibility of the reagent that one part of nitric acid will color in a distinct manner even 24,000 parts of liquid. This color is due to deutoxide of nitrogen, which is produced and remains dissolved in the excess of the sulphate of iron.

To detect the existence of nitrogen in a gas, it is to be exploded in an eudiometer, along with three or six times its bulk of a mixture of equal parts of hydrogen and oxygen; the instrument is then to be washed with sulphuric acid, to which some drops of protosulphate of iron has been added, and if nitrogen has been present, the small quantity of nitric acid produced by the explosion will be sufficient to produce a distinct color in the liquid.

L'Institut.

On the oil of Mint, and upon a new carburet of hydrogen derived therefrom, by M. WALTER.–Oil of mint, pure and crystallized, melts at 34° c. and boils at 213.°5. It is composed of

C^{40}	1530.40	0.7727
H^{40}	250.00	0.1262
O^{2}	200.00	0.1011

The density of its vapor was found to be 5.62, the formula gives 5.455.

On adding to this oil small quantities of anhydrous phosphoric acid, until there ceases to be any increase of temperature, distilling and then re-distilling with anhydrous phosphoric acid, we obtain a transparent liquid which boils at 163° c., and which I designate by the name of *menthene*. This substance is composed of

C^{40}	1530	0.8718
H^{36}	225	0.1282

I found the density of its vapor to be 4.93 to 4.94; calculation gives 4.835. In evaporating, it becomes brown and slightly altered.

Acad. des Scien.

On a new carburet of Hydrogen, by M. CAHORE.—On treating the oil of potatoes, which is an alcohol, by anhydrous phosphoric acid, and distilling several times from this acid, we obtain a liquid, oily, light, of an aromatic odor, boiling at about 160°, and composed of

C^{20}	0.86
H^{20}	0.14

This is then a true carburet of hydrogen, having the same composition as methylene and olefiant gas; and differing but in the state of condensation of its elements. I found the density of its vapor to be 5.06; by calculation it should be 4.904, on the supposition that C^{20} and H^{20} represent two volumes. *Ib.*

A method to prepare the Sulphate of Iron so as to preserve it always at a minimum of oxidation, by M. BERTHEMOT.—Having dissolved the sul-

phate of iron of commerce in water acidulated with sulphuric acid, and then crystallized, the crystals are to be dissolved in hot distilled water, in the proportion of 500 of the salt to 550 parts of water, and 8 parts of iron turnings to be added. The solution, after a few moments, is to be filtered while yet hot, the filter having been previously moistened with water, to facilitate the passage of the liquid. The solution is to be received in a vessel in which there has been previously placed 375 pints of alcohol of 33°—36°, and 8 pints of sulphuric acid ; during which the liquid is to be quickly stirred with a glass rod. The sulphate of iron immediately precipitates under the form of a blueish white crystalline powder, and thus prepared, it is not altered on exposure to the air. It likewise contains the same quantity of water of crystallization as that deposited from an aqueous solution, if the temperature does not exceed 80°, but when boiled with strong alcohol it loses part of this water. *Journ. de Pharm.*

Preparation of pure Narcotine.—Dr. O'Shaughnessey gives the following method for the preparation of narcotine :—The only process yet published by which pure narcotine can be obtained is that devised by Pelletier, but this method, nevertheless, is tedious, troublesome, and apt to fail, unless in very expert hands. I am happy, therefore, in being enabled to propose for the sanction of the Committee a process which is at the same time simple, economical, and productive, which *ensures the separation of the febrifuge narcotine from the powerful sedative morphia*, and which can be performed in every locality where opium can be found. The process is, as far as I am aware, altogether new.

Preparation of Muriate of Narcotine.

Take of Bengal opium . . . . . 2lbs.
Alcohol . . . . . 20lbs.

Rub them well up together in a large mortar, adding the spirit by degrees until the opium is exhausted of its soluble parts. Decant the solution and press the insoluble part.

To the alcoholic solution add as much ammonia as renders the liquid slightly turbid. Distil from a common alembic till fifteen pounds of the alcohol are recovered; draw off the fluid in the still and set it aside to cool.

On cooling it deposites a mass of colored crystals composed of narcotine, meconate of ammonia, and resin. Wash with water, which dissolves the meconate of ammonia, then with one quart of water and one drachm of muriatic acid, which dissolves the narcotine and leaves the resin—filter. The solution, which is of a rosy color, is to be evaporated to dryness.

The muriate of narcotine thus prepared is a transparent resinous mass, of a rosy color, brittle vitreous texture, very soluble in distilled water and spirits, and intensely bitter.

A beautifully crystalline muriate of narcotine may be prepared by pre-

cipitating the muriate thus made, by ammonia, and dissolving the precipitate in boiling alcohol, from which the narcotine separates in fine crystals as the solution cools. The crystallized narcotine placed in a tube and subjected to the influence of a stream of muriatic acid gas combines with the acid while it retains its original crystalline form. But this process, though more elegant, is too expensive and elaborate for general use, and the non-crystalline muriate is just as valuable as the more beautiful product now described.

A seer of Bengal opium yields by this process an average of one ounce of muriate of narcotine, and also one ounce of muriate of morphia. Now the seer of opium costs four rupees, the spirit costs one rupee, the ammonia four anas, labor and fuel four anas, or a total of five rupees, eight anas per one ounce of muriate of narcotine, and one ounce of muriate of morphine. The latter salt is in general demand, and its issue from the public stores only limited by its high price. Hitherto it has been imported in small quantities from Europe at the enormous cost of 1*l.* 10*s.* the ounce. Were the Government to sanction the preparation of muriate of narcotine here for the supply of our hospitals, the sale, as surplus stores of a part of the morphine obtained from the same opium at the same time, and by the same process, would, at half the present English price, give the narcotine at *one rupee* the ounce, one-fourth of what quinine at present costs.

Calcutta Quarterly Journal.

Tests for opium,—mode of keeping extracts.—At a meeting of the Medico-Botanical Society, April 10, 1839, Mr. Everitt stated, that having lately had to conduct experiments for the purpose of deciding whether opium were present or not in the stomach of persons on whom a coroner's jury had to sit, he had paid some extra attention to the subject. Generally speaking, in the search after opium, it was the object of the chemist to eliminate the morphia; but it was difficult to decide whether this was present or not, inasmuch as other alkaloids would give the same results when experimented upon. Chemists had long known that meconic acid, when acted upon by a solution of a peroxide salt of iron, was changed to a deep-red color. So far, then, it was a test of the presence of opium. This test, however, was liable to doubt, inasmuch as sulphocyanic acid, which Tiedemann had proved to exist in the saliva, would be acted upon similarly to the meconic acid, on the addition of a solution of a per-salt of iron. Hence, at a trial at Glasgow, in which there could be little doubt that opium was present in the stomach of a person supposed to have been killed, the counsel for the defence of the prisoner objected to the testing of the presence of meconic acid by the solution of iron, on the above ground, and the objection was considered fatal. He (Mr. Everitt) had endeavored of late to obtain, by experiment, the means of distinguishing whether the red color in question was produced by the presence of meconic acid, or of sulpho-

cyanic acid.* After a number of experiments upon this point, he had found that if the red color depended upon the presence of sulphocyanic acid, the addition of a solution of corrosive sublimate had at once an entire bleaching effect upon the tested liquid; while, on the contrary, should the red color depend upon the presence of meconic acid, the solution of corrosive sublimate has no effect. The above test had held good in a variety of experiments in which the tested fluid was combined with various animal secretions, &c.

Mr. Everitt then exhibited a preparation of extract of henbane, which he had kept in a close-stopped bottle for two years; the extract was in a high state of preservation. Previous to placing it in the bottle he had drawn off all the moisture from the extract by placing it under an air-pump with sulphuric acid. Mr. Everitt then threw out some hints on the advantage of keeping extracts free from moisture. *Lancet.*

Dupuytren's Pommade for the Hair.—The following formulæ of this pommade are given, each as genuine, in a late number of the "Journal de Pharmacie."

By M. Fontaine.

Beef marrow, four ounces;
Calomel, two drachms and a half;
Alcohol. ext. of cantharides, eighteen grains;
Essence of roses, four drops.

By M. Cap.

Beef marrow, two ounces;
Extract of canthar., eight grains;
Oil of roses, one drachm;
Essence of lemon, four drops.

The following, M. Recluz assures us, was shown to Dupuytren himself, at the Hotel-Dieu, and acknowledged by him to be exact.

Beef marrow, six ounces;
*Nervine balsam, two ounces;
Peruvian balsam, two ounces;
Oil of almonds, an ounce and a half;
Ext. of cantharides, sixteen grains;
Alcohol at 30°, one drachm.

Dissolve the cantharides in the alcohol; melt the marrow and the nervine balsam with the oil, and pass them through a fine filter; then agitate until it acquires the consistence of spermaceti, and add to it the Peruvian

* Nearly ten years ago, Dr. O'Shaughnessy pointed out, in The Lancet, the fact that the meconate and sulphocyanate of iron might be distinguished from one another by means of an alkaline solution. The sulphocyanate is immediately *bleached* to a dead pale white by the alkali, while the meconate, on the contrary, becomes deeper in its tint.—Ed. Lancet.

* For the composition of this balsam, see "Edward's Manuel," p. 158.

balsam, and afterwards the alcoholic solution. When the pommade has well set, fill two pots, containing each two ounces. *Ib.*

Employment of Sulphate of Quinine in the form of ointment for the cure of malignant intermittents.—Dr. Antonini, principal physician of the French Army in Africa, extols the efficacy of sulphate of quinine employed in the form of ointment in the cure of malignant intermittent fevers. The following is his formula for the preparation of this ointment:—Take of sulphate of quinine ℥j, alcohol 38° to 40° q. s. (about ℥ij,) acid. sulphur. q. s. (about 80 drops) axung. ℥iv. It is essential that the solution in alcohol be complete and filtered, and that the mixture be made gradually and with care, otherwise the quinine returns to its original condition, and its absorption does not take place. The usual quantity employed at one time is about half an ounce of the ointment, but this dose may be doubled in severe cases.

The mode of applying it is by frictions to the groins, and it is also placed in the axilla. *Journ. des Connaiss. Med. Chirurg.* Oct. 1838.

Formulæ for Syrups of Copaiba.—M. Emile Mouchon of Lyons gives the following formula for the preparation of a magnesian syrup of copaiba: R. Bals. Copaib. ℥iv; Magnes. Calc. gr. xxxij; Ess. Menth. pp. gtt. lxiv; Syrup. Simp. ℥lx. Dissolve the magnesia in the balsam of copaiba, and when the solution is complete, add the essence of mint and the simple syrup, triturating them together for a long time. This preparation M. Mouchon states has nearly the appearance of orgeat syrup, and with but little of the taste of Copaiba.

The following is the formula for the gummy syrup of copaiba of Dr. Puche:—℞. Bals. Copaib. ℥ij; Pulv. gum Arab. ℥ss; Aq. Puræ ℥iss; Ol. Menth. pp. gtt. xxxij; Syr. Simp. ℥xij. The balsam of copaiba is to rubbed up with the water and gum arabic, then the essential oil, and finally the syrup is to be added. An ounce of this syrup contains a drachm of the copaiba. It is said to be better borne by the stomach than other preparations of copaiba. *Journ. des Connaiss. Med.* Nov. 1838.